United States
Department of
Agriculture

Humboldt-Toiyabe
National Forest

Biological Evaluation for Region 4 Forest Service Sensitive Plant Species

Carson and Bridgeport
Ranger Districts

California Integrated Weed Management Project

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I. Introduction

The purpose of this Biological Evaluation (BE) is to review the potential effects of the proposed California Integrated Weed Management Project (CAIWMP) on Region 4 Forest Service Sensitive plant species. Specifically, the BE determines whether the proposed action would result in a trend toward any Sensitive plant species becoming federally listed as Threatened or Endangered under the Endangered Species Act (1973, as amended). This BE was prepared in accordance with Forest Service Manual (FSM) direction 2672.42 and meets legal requirements set forth under section 7 of the Endangered Species Act of 1973, as amended, and implementing regulations [19 U.S.C. 1536 (c, 50 CFR 402.12 (f) and 402.14 (c)].

The Carson and Bridgeport Ranger Districts are proposing to implement this integrated weed management project to treat terrestrial, non-native invasive plants on the Humboldt-Toiyabe National Forest System lands in California. The project area includes approximately 693,721 acres across nine California counties and two Ranger Districts, Carson and Bridgeport. The Forest Service also proposes to use a variety of methods to treat noxious and invasive plant species including prevention, mechanical, manual (hand-pulling), chemical, biological controls and prescribed burning. The purpose is also to establish criteria, under which an Early Detection Rapid Response (EDRR) approach would be implemented, thereby allowing for rapid treatment of newly discovered target invasive plants. The project includes annually treating a portion of the invasive plant infestations that occur in California on the Humboldt-Toiyabe National Forest (HTNF). The number of infestations and acres treated each year will depend upon available funding. Treatments would involve integrated prescriptions that generally combine the use of herbicides with mechanical, manual, and biological control methods over several years. The project would include treating existing populations as well as any future infestations that might occur.

This Biological Evaluation documents potential effects from project activities to 25 Region 4 Forest Service Sensitive plant species. Of these, 20 are known to occur within the CAIWMP area: *Astragalus johannis-howellii* (Long Valley milkvetch), *Astragalus oophorus* var. *lavinii* (Lavin's eggvetch), *Boechera bodiensis* (Bodie Hills rockcress), *Boechera tiehmii* (Tiehm's rockcress), *Botrychium ascendens* (upswept moonwort), *Botrychium crenulatum* (dainty moonwort), *Botrychium tunux* (moosewort), *Carex tiogana* (Tioga Pass sedge), *Cusickiella quadricostata* (Bodie Hills draba), *Draba asterophora* var. *asterophora* (Tahoe draba), *Ivesia aperta* var. *aperta* (Dog Valley ivesia), *Meesia triquetra* (three-ranked hump-moss), *Orthotrichum shevockii* (Shevock's bristle-moss), *Orthotrichum spjutii* (Spjut's bristle-moss), *Phacelia monoensis* (Mono phacelia), *Pinus albicaulis* (whitebark pine), *Polemonium chartaceum* (White Mountain skypilot), *Polyctenium williamsiae* (William's combleaf), *Senecio pattersonensis* (Mono ragwort) and *Streptanthus oliganthus* (Masonic Mountain jewelflower). In addition, there is potential habitat for five species that are not recognized as endemic to Nevada: *Boechera rigidissima* var. *demota* (Galena Creek rockcress), *Botrychium lineare* (slender moonwort), *Ivesia aperta* var. *aperta* (Sierra Valley ivesia), *Ivesia sericoleuca* (Plumas ivesia) and *Poa abbreviata* var. *marshii* (Marsh's bluegrass). No other currently listed Region 4 Forest Service Sensitive plant species are known to occur or have potential habitat within the project area (Section IV below).

II. Current Management Direction

Current management direction on desired future conditions for Sensitive plant species on the HTNF can be found in the following documents, filed at the Carson Ranger District (RD):

-Forest Service Manual and Handbooks (FSM/H 2670)
-National Forest Management Act (NFMA)
-Endangered Species Act (ESA)
-National Environmental Policy Act (NEPA)
-Toiyabe National Forest Land and Resource Management Plan (LRMP)
-Sierra Nevada Forest Plan Amendment (SNFPA)
-Intermountain Region (R4) Sensitive Species List
-Conservation Strategy for Mono Phacelia (*Phacelia monoensis* R. Halse)
-Conservation Assessment of Sierra Valley Ivesia (*Ivesia aperta* var. *aperta* M. Aitken)
-Interim management guide for *Ivesia aperta* var. *aperta*, *Ivesia aperta* var. *canina*, *Ivesia sericoleuca*

III. Description of the Proposed Project

The project area is located across the Bridgeport and Carson Ranger Districts in Alpine, El Dorado, Lassen, Mono, Nevada, Placer, Plumas, Sierra, and Tuolumne counties, California The integrated weed management plan would provide direction for treatment of noxious and invasive weed species across approximately 693,721 acres on the two ranger districts and located in California (Table 1). Map 1 provides a vicinity map that illustrates the project area. Maps 2 - 4 shows the current locations of invasive weed populations in the northern portion of the project area (Map 2), the central portion of the project area (Map 3) and the southern portion of the project area (Map 4).

Table 1. Acres of Humboldt-Toiyabe National Forest (HTNF) System Lands that occur within California (Project Area).

County	Ranger District	Acre of Land in California within HTNF Jurisdiction
Lassen	Carson	1,616
Plumas	Carson	7
Nevada	Carson	4,369
Sierra	Carson	30,029
El Dorado	Carson	45
Placer	Carson	68
Alpine	Carson	254,459
Mono	Bridgeport	402,808
Tuolumne	Bridgeport	320
TOTAL:		**693,721**

The terms “weeds”, “noxious weeds”, “non-native invasive plants”, “invasive plants” and “invasive plant species” are used interchangeably throughout this document to describe terrestrial, non-native plant species that pose a threat to native plant communities.

ALTERNATIVE 1 – NO ACTION

Under the No Action Alternative, control and/or eradication of noxious and invasive weeds would not occur on HTNF lands that occur in California. Prevention measures, inventory, and monitoring would continue as Environmental Analysis under the National Environmental Policy Act (NEPA) is not required for these activities. While prevention measures will help slow the spread of invasive plants, prevention alone is insufficient to address the spread of existing infestations. Invasive plant treatments associated with existing NEPA decisions (Table 2) would continue to occur but new or additional efforts would not be implemented.

Table 2. Invasive Plant Treatments Associated with Existing NEPA Decisions

Project	Weed Species	Treatment Method	Date
Dog Valley Fuels Reduction and Ecosystem Enhancement	Musk thistle, spotted knapweed, cheatgrass, medusahead	*Hand pulling; clipping	2009 (ongoing)
Dog Valley Route Adjustment Project	Musk thistle, spotted knapweed, cheatgrass, medusahead	*Hand pulling; clipping	2009 (ongoing)
West Carson Route Adjustment Project	Perennial pepperweed, bull thistle	*Hand pulling; clipping	2013 (ongoing)
Markleevillage Fuels Reduction Project	Bull thistle, cheatgrass	*Hand pulling; clipping	2010(ongoing)
East Alpine Rangeland Project	Bull thistle, Canada thistle cheatgrass	*Hand pulling; clipping	2012(ongoing)
East Carson River Restoration	Bull thistle, cheatgrass	*Hand pulling; clipping	2011(ongoing)
Wheeler Creek Habitat Restoration Project	No weeds present but monitoring	*Hand pulling; clipping	2014
Bridgeport Travel Management	Hoary cress, bull thistle, Canada thistle, cheatgrass	*Hand pulling; clipping	2011

* Because hand pulling is not always effective or feasible for some species that occur in large scattered populations (such as medusahead and cheatgrass) or for long tap-rooted perennial species (perennial pepperweed, Canada thistle); many of the infestations have the potential to increase.

ALTERNATIVE 2 - PROPOSED ACTION

The Proposed Action includes annually treating a portion of the invasive plant infestations that occur in California on the Humboldt-Toiyabe National Forest. The number of infestations and acres treated each year will depend upon available funding. Treatments would involve integrated prescriptions that generally combine the use of herbicides with mechanical, manual, and biological control methods over several years. The proposed action would include treating existing populations as well as any future infestations that might occur.

Implementing Treatment Strategies

For each known invasive plant infestation, and for future infestations that may be discovered, one of three treatment strategies is proposed:

1. Annually treat and monitor the infestation with the goal of eradication

Infestations of species documented as highly invasive with severe or substantial ecological impacts in California and those that are currently limited in their distribution and abundance on the Forest making their eradication an achievable goal.

2. Treat and monitor a portion of the identified occurrences each year, focusing on reducing the area coverage and amount over time (eradicate/control)

   Under this strategy, invasive plant species would be annually treated, focusing first on eradicating and then containing the most isolated, outlying occurrences and, over time, reducing the footprint of larger, less isolated occurrences. Treatments will also be designed to contain infestations along transit routes in order to prevent these invasive plants from moving into natural forest settings. Where appropriate, restoration and reclamation activities would be designed to lower spread potential.

3. Treat only leading edge infestations or where concurrent with higher priority species (control)

   Under this strategy targeted efforts to control, contain or eradicate certain species would be a lower priority for one or more of the following reasons: 1) the species is less invasive and unlikely to create large monocultures on NFS lands; 2) the species cannot be feasibly addressed with available treatments at the Forest- wide scale; or 3) the species is not causing significant ecological impacts.

Criteria for prioritizing treatment sites, given limited funding, will follow the following guidelines:

1. Infestations with a high potential for future spread (prolific species found in high traffic areas such as administrative sites, trailheads, major access points for the forest, and systems vulnerable to invasion (recent fires)
2. High value areas (such as Wilderness) and portals to these areas
3. Early invaders with small isolated infestations on the forest.
4. Leading edge and satellite occurrences of larger more established infestations
5. Treating the perimeter of larger infestations

Using the above criteria, in addition to other site specific information, the HTNF will focus on 12 non-native invasive species (Table 3) for treatment and monitoring. Figures 2, 3, and 4 show locations of existing weed populations located within the project area. Note that additional invasive plant species have been mapped or are known to occur on the forest, but would not be targeted for eradication or control at this time due to widespread occurrence or limited ecological impact.

Table 3. Priority Weed Species for Treatment and Associated Treatment Goal

Weed Species	Currently Mapped Acres	Number of Known Locations
Russian Knapweed (*Acroptilon repens*)	0	0
Diffuse Knapweed (*Centaurea diffusa*)	2	12
Spotted knapweed (*Centaurea maculosa*)	5	4
Musk Thistle (*Carduus nutans*)	462	57

Weed Species	Currently Mapped Acres	Number of Known Locations
Scotch Thistle (*Onopordum acanthium*)	12	21
Bull Thistle (*Cirsium vulgare*)	234	62
Canada Thistle (*Cirsium arvense*)	8	19
Yellow-Star Thistle (*Centaurea solstitialis*)	4	3
Perennial Pepperweed (*Lepidium latifolium*)	12	5
Hoary Cress (whitetop) (*Cardaria draba*)	204	19
Medusahead (*Taeniatherum caput-medusae*)	223	13
Cheatgrass (*Bromus tectorum*)	unknown	unknown
Curly dock (*Rumex crispus)* [1]	unknown	unknown

1 Curly dock is not on the California or Nevada State Noxious Weed Lists; however, this species has been documented in TECPS species habitat within the project area.

Additional Details of the Proposed Action

PREVENTION

A major component of the CAIWMP will include incorporating measures into project planning and project implementation that prevent, or greatly reduce the potential for weeds to become established. To prevent the spread of noxious and invasive weeds, the following preventive measures will be incorporated into the CAIWMP:

- **Noxious Weed Risk Assessment** -Forest Service Manual 2081.02 requires a noxious weed assessment be conducted when any ground disturbing action or activity is proposed to determine the risk of introducing or spreading noxious weeds associated with the proposed action. For projects having moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that must be undertaken during and/or before project implementation. The Risk Assessment includes information on current condition of the project area, potential risk of increased spread and design features to minimize potential for new infestations. The Assessment also determines if weed treatments need to occur prior to commencement of project activities.

- **Best Management Practices** (BMPs)-incorporate BMPS for weed prevention into all project planning efforts which include a ground disturbing component. BMPS include (but not limited to):
    - Require all construction vehicles to be inspected for weeds prior to entering work site
    - Set up weed wash stations and clean all equipment before leaving the project site if operating in areas infested with weeds.
    - Locate and use weed-free project staging areas.
    - All sand, gravel, borrow, and fill material will be inspected and certified weed free

- To the extent feasible, design project areas to avoid known noxious weed infestations; if unavoidable then assess if pretreatment needs to be conducted prior to construction activities.
- Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes;
- Incorporate a post monitoring and treatment plan into all ground disturbing project planning efforts. Monitoring should continue for a minimum of five years after the project is completed to assure an Early Detection Rapid Response (EDRR) to new infestations.

- **Revegetation (following Forest Service Project Activities)-**
  Revegetation will involve site preparation, such as raking to prepare a seed bed to promote seed germination, planting of seeds and/or propagules (depending on the species, this is done either in early spring or late fall to take advantage of available moisture), vigilant treatment of invasive plants as they germinate from the existing seedbank, and monitoring the results. In some cases, a follow-up seeding/planting may need to be done.

  Revegetation with carefully selected plant materials is a critical component of integrated weed management strategies. Commonly used control tactics, such as manual or chemical treatments, in effect create a disturbance on the current vegetation community. These control tactics may eliminate or suppress target invasive species in the short term, but the resulting gaps in vegetation and bare soil create open niches susceptible to secondary invasion by the same or other undesirable plant species. The spot method can leave sites open to secondary invasion since larger areas of vegetation are eliminated.

  Spot spray areas would be reviewed and determination made about the need for active restoration. Areas with bare soil created by the treatment of invasive plants would be evaluated for restoration needs by a botanist and soil scientist. Revegetation would occur where needed to meet resource goals, including desired conditions for ground cover and native plant composition.

  Determining the need for active restoration/revegetation versus passive restoration (allowing plants on site to fill in a treated area) is the first step when addressing this need. Passive restoration depends on re-colonization from the existing seedbank and from plant propagules dispersed from surrounding sources, as well as native species from within the invasive plant site. Passive restoration may be appropriate where treated sites leave relatively little bare ground or along less-disturbed roadsides where adjacent native vegetation can provide adequate seed source to recolonize treated areas.

  Active revegetation is a long-term commitment that would be focused on areas that are either ecologically unique, or where active revegetation is necessary to provide competition for highly aggressive invasive plant species. In some cases, active restoration is not the preferred choice due to the nature of the site. Examples include continually disturbed areas, such as road shoulders that are frequently maintained, active landings, and river banks that are prone to annual scouring.

  Old roadbeds, mining sites, are examples of sites that are unproductive but need stabilization. Revegetation may be difficult since these sites are not yet ready to support desired native vegetation. Applying groundcover with mulch stabilizes the site against erosion, while creating a weed barrier. For these extreme cases, the initial site

stabilization methods are the first stage for future revegetation efforts. The following best management practices would be applied during any restoration efforts:

Include weed prevention measures, including project inspection and documentation during project operations;

- Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation;
- To prevent conditions favoring weed establishment, re-establish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques;
- Maintain stockpiled, weed-free material in a weed-free condition;
- Revegetate disturbed soil in a manner that optimizes plant establishment for each specific project site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary.
- Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules;
- Inspect and document all limited term ground-disturbing operations in weed infested areas for at least three growing seasons following completion of the project;
- Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available;
- Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines);
- Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established.

INVENTORY

Information on the presence, location and distribution of noxious and invasive weeds is a key first step to all subsequent management efforts. Once located, noxious and invasive weeds would be mapped in GIS and recorded in the Forest Service FACTS database. Mapping provides information about the extent of the infestation, transport vectors, and the effectiveness of the control methods. Over the long-term, mapping can provide historical data for the epicenter of an infestation, rate and direction of spread.

CONTROL/ERADICATION

Manual Methods

Manual treatment involves the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Treatments include cutting noxious and invasive weeds above the ground level; pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth; cutting at the ground level or removing competing plants around desired species; or placing mulch around desired vegetation to limit competitive growth.

- **Hand Pulling:** Pulling or uprooting plants can be effective against some shrubs, tree saplings, and herbaceous invasive plants. Annuals and tap-rooted plants are particularly susceptible to control by hand-pulling. It is not as effective against many perennial

invasive plants with deep underground stems and roots that are often left behind to re-sprout. The advantages of pulling include its small ecological impact, minimal damage to neighboring plants, and low (or no) cost for equipment or supplies.

- **Pulling Using Tools:** Most plant-pulling tools are designed to grip the plant stem and provide the leverage necessary to pull its roots out.
- **Clipping:** "Clipping" means to cut or remove seed heads and/or fruiting bodies to prevent germination. This method is labor-intensive and effective for small and spotty infestations.
- **Mulching:** Covering with certified "weed free and plastic free" mulch such as rice straw, grass clippings, wood chips, newspaper.
- **Tarping:** Placing tarps to shade out weeds or solarize them (to injure by long exposure to heat of the sun).

Mechanical Methods

- **Mowing-** Mowing is a suppression measure that can prevent or decrease seed head production. To be effective in treating invasive species such as annual grasses (cheatgrass), mowing needs to occur every two to three weeks until flowering is completed. Mowed weeds will re-grow and set seed from a reduced height so a combined control method is generally necessary to be effective. Mowing would be conducted using a small (700 lb) Bobcat ®-loader equipped with a mower attachment. Because mowing requires repeated treatments in the same year, can only be used on relatively flat (slopes less than 20%) and non-rocky terrain, this method will only be used in rare circumstances to treat small (less than 20 acres) infestations of invasive grasses. Mowing of invasive grasses over a small area produce minimal biomass and will not suppress native plant regeneration.
- **Cutting with a Hand-held String or Blade Trimmer-** Mowing or cutting with handheld gas or battery powered string or blade trimmer. Treatment method is essentially the same as described above for the Bobcat ® mower but would generally be used to treat much smaller areas (less than one acre). Again this treatment would be rarely used as it requires multiple cuttings to be effective and follow up treatments with other controls such as herbicide or biological controls.

Biological Controls

Biological control involves using living organisms, such as insects, pathogens, or grazing animals, to suppress weed infestations. This treatment method is generally most appropriate in situations where weed infestations are large and well established, and on sites where other control methods are not feasible. Biocontrol methods generally suppress host weed populations, but may not contain or eradicate them.

- **Insects**-Biological control using insects is used to reduce a targeted weed population to an acceptable level by stressing target plants and reducing competition with the desired plant species. Insect agents are generally used for large expansive monocultures of noxious and invasive species. Insect agents including plant eating insects, nematodes, flies, mites and, pathogens typically require 3-5 years for establishment and can limit the spread and density of target weed species by feeding on leaves, stems, roots and/or seed heads. Insects can affect plants directly by destroying vital plant tissues and functions, and indirectly, by increasing stress on the plant, which may reduce its ability to compete with other plants. Often, several biological control agents are used together to reduce noxious and invasive weeds density to an acceptable level.

Biological control agents, with the exception of certain microorganisms, are exempt from regulation by the Environmental Protection Agency (EPA). Biological control agents are permitted for release by the USDA Animal Plant Health Inspection Service (APHIS). The California Department of Pesticide Regulation maintains a list of biological control agents available for release in California.

- **Targeted Grazing**- Domestic animals, such as cattle, sheep, or goats, control the top-growth of certain noxious and invasive weeds which can help to weaken the plants and reduce the reproduction potential. The animals benefit by using the weeds as a food source and, after a brief adjustment period, can consume 50 percent or more of their daily diet of the weed, depending on the animal species. Although some Forest Service livestock grazing permits include authorizing cattle to graze invasive species such as cheatgrass, under the California Integrated Weed Management Project, livestock are only used under specific "targeted grazing" conditions. In targeted grazing, the kind of animals and amount and duration of grazing are specifically designed to help control a particular species of plant while minimizing the impacts on perennial native vegetation that is needed to help reduce the likelihood of reinvasion by undesirable plant species. Targeted grazing includes the use of goats, sheep, or other livestock that have been specifically 'trained' by their operators to eat certain plant species. Generally the operator also uses a portable fencing system to help 'target' the animals on focal species. Grazing animals, either alone or in combination with other treatment methods, can be highly effective in reducing weed populations through the use of targeted grazing prescriptions.

Other Treatment Methods

- **Prescribed Burning**- ***Prescribed burning will not be conducted in any occupied or critical habitat for TEP species.*** For the rest of the project area, prescribed burning would only be used in very limited situations where burning could help achieve management objectives. Prescribed burning can be used to control large expansive monocultures of cheatgrass and medusahead infestations. To be successful, burning would occur in combination with other weed treatments to prevent re-colonization with weed species (e.g. herbicide, seeding etc). Monitoring of burned sites would continue for several years to determine if follow-up treatments are necessary. A site specific burn plan, and close consultation and coordination with a fuels specialist, would be completed before any prescribed burning activities occurred. The burn plan would specify burning conditions necessary to minimize the threat of escaped fire from occurring.

Herbicide Methods

Chemical treatment involves the application of herbicides (chemical compounds), via a variety of application methods, at certain plant growth stages to kill noxious and invasive weed species. Depending on the type of herbicide selected, they can be used for noxious and invasive weed control or complete eradication and may be used in combination with other control treatments. Selection of an herbicide for site-specific application would depend on its chemical effectiveness on a particular noxious or invasive weed species, habitat types present, proximity to water, and presence or absence of sensitive plant, wildlife, and fish species. Herbicides are most effective on pure stands of a single noxious or invasive weed plant where desirable and non-target plants are scarce or absent.

Chemicals can be used alone or in tank mixtures. Tank mixtures are only used if existing recommendations are available from State Department of Agriculture or other official resources

such as Universities and or County cooperative extensions. If two or more different chemicals of the formulations are approved as a tank mixture on one or more of the labels, or have written recommendations for a tank mixture from the State Department of Agriculture, then it is permissible to tank mix these chemicals for a spray program. In addition to herbicides, a blue dye is added to tank mixtures to assist with monitoring the extent of the treatment coverage. The dye helps to reduce the chance of under and over application and would help detect and manage drift. Use of dye also reduces the risk to non-target species as a result of over application of herbicide and assures treatment of target species. Dye is water soluble, breaks down in sunlight, and washes away easily with water.

Herbicides would be used to control and eliminate new areas of noxious and invasive weeds spread and to contain the spread of existing infestations. Depending on the level of infestation, the type of weed species (e.g. deep rooted perennial or biannual) and/or its proximity to sensitive areas (e.g. water) herbicides can be applied through a variety of methods as described below:

- **Directed Broadcast/Spot Spray -** Accomplished by sprayer wand with regulated nozzle in such a fashion that spray is concentrated at the target species. This is typically accomplished using a backpack sprayer.
- **Broadcast Spray -** Broadcast application (using truck/UTV mounted sprayers) over wider areas would be used only when necessary to treat large infestations. In some instances, broadcast spraying may be the only effective way to treat very dense and extensive weed infestations. When using broadcast spray drift reduction measures will be used. This will include low spray pressure of 30PSI or less, spray nozzles with large orifices. Wind speeds of 8mph or less and no treatment if inversions are present. Drift cards will be used to help monitor spray applications.
- **Hand/Selective -** Treatment of individual plants to avoid spraying other desirable plants. There is a low likelihood of drift or delivery of herbicides away from treatment sites. This method is used in sensitive areas, such as near water, to avoid getting any herbicide on the soil or in the water. Hand/Selective methods could be done under more variable conditions than spot spraying or broadcast spraying. Specific methods include:
    - Dip and clip – similar to cut stump, where cutting tool is first dipped in herbicide, then used to cut target species to be treated
    - Cut stump – herbicide is sprayed on cut surfaces to eliminate or greatly reduce re-sprouts;
    - Wicking and wiping – herbicide is wiped onto the target species using a wick applicator.

Proposed Herbicides

Seven herbicides are proposed for use in this project, using the application methods described above: ***Aminopyralid, Chlorsulfuron, Glyphosate, Imazapyr, Rimsulfuron, Sulfometuron-methyl*** and ***Tryclopyr.***

When appropriate, herbicides with different modes of action can be used to treat invasive plant species. Alternating herbicide types can help reduce the risk of populations developing herbicide tolerance from repeated application with the same herbicide.

Only herbicides that have been approved for use in the state of California and have a label certifying that the chemical has been approved for use by the Federal Environmental Protection

Agency (EPA) and the California Department of Pesticide Regulation (DPR), would be used. The EPA requires the manufacturers to conduct ecological risk assessments that include toxicity testing on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants. An ecological risk assessment uses the data collected to evaluate the likelihood that adverse ecological effects may occur as a result of herbicide use.

The Forest Service also conducts its own risk assessments, focusing specifically on the type of herbicide uses in forestry applications. The Forest Service contracts with Syracuse Environmental Research Associates, Inc. (SERA) to conduct human health and ecological risk assessments for herbicides that may be proposed for use on NFS lands (SERA 2007). The SERA risk assessments represent the best science available, using peer- reviewed articles from the scientific literature and current U.S. EPA documents, such as Confidential Business Information, to estimate the risk of adverse effects to non-target organisms. The risk assessments consider worst-case scenarios including accidental exposures and application at maximum label rates. Once a risk assessment is completed, pesticide use proposals are submitted to the Forest Supervisor for approval. Only herbicides that have SERA risk assessments and approved Pesticide Use proposals are proposed in this action, with the exception of one chemical, Rimsulfuron. Rimsulfuron is an effective herbicide in the treatment of annual grasses and is preferable over Sulfometuron-methyl due to its relative stability in soils and overall better environmental characteristics. The Forest Service is in the process of developing a Pesticide Use Proposal for Rimsulfuron. Once a USFS Pesticide Use Proposal is completed, the HTNF will no longer use Sulfometuron-methyl and will replace it with Rimsulfuron for the treatment of annual grasses.

Label directions, as well as all laws and regulations governing the use of pesticides, as required by the U.S. Environmental Protection Agency, the California Department of Pesticide Regulation, and Forest Service policy pertaining to pesticide use, would be followed. Coordination with the appropriate County Agricultural Commissioners would occur, and all required licenses and permits would be obtained prior to any pesticide application. The label contains information about the product, including its relative toxicity, potential hazard to humans and the environment, directions for use, storage and disposal, and first aid treatment in case of exposure. Label directions provide for public and worker safety by requiring posting of treated areas, pre-designation of mixing, storage and filling sites, and transportation and handling practices in accordance with toxicity of each formulation. Where herbicide treatments are proposed, the lowest effective label rates would be used. A site-specific safety and spill plan would be developed prior to herbicide applications.

The following is a short description of the proposed herbicides and their uses:

Aminopyralid - Aminopyralid is a pre- and post-emergent herbicide that can control a number of key invasive broadleaf species. Aminopyralid provides residual weed control activity, reducing the germination of target plants and the need for re-treatment. The herbicide has a lower effective application rate (compared to other registered herbicides) and a non-volatile formulation. Aminopyralid is labeled in California for use to the water's edge. For best results aminopyralid is generally applied to young weeds that are actively growing during time of application. It is proposed for use primarily on starthistles, knapweeds, and Canada thistle using directed foliar spray, broadcast spray or wicking. Broadcast spray would be limited to disturbed areas dominated by non-native species. A product example is **Milestone.**

Chlorsulfuron - Chlorsulfuron is a selective pre- and post-emergent herbicide used to control many broadleaf species. Chlorusulfuron would be used primarily as a post-emergent for use on

tall whitetop, *(Lepidium latifolium)* and hoarycress (*Cardaria spp.*), using directed foliar spray or wiping. A product example is **Telar.**

Glyphosate - Glyphosate is a non-selective systemic herbicide that can control most annual and perennial plants. Glyphosate rapidly binds to soils, and is not readily absorbed by plants roots. Its non-selectiveness causes this herbicide to kill most plants where applied, including desirable native species. Plants can take several weeks to die and a repeat application in the same season is sometimes necessary to remove plants that were missed during the first application. Only formulations without a premixed surfactant are being proposed for use. Aquatic formulation of glyphosate can be used in aquatic settings. Product examples include **Accord, Rodeo** or **Aquamaster.**

Imazapyr - Imazapyr is a non-selective herbicide used for the control of a broad range of weeds including terrestrial annual and perennial grasses and broadleaved herbs, woody species, and riparian and emergent aquatic species. It can be applied pre-emergent, but is most effective when applied as a post-emergent herbicide. A product example is **Habitat**.

Rimsulfuron - Rimsulfuron is an effective herbicide to control annual grasses such as cheatgrass and medusahead. It is absorbed through the plants leaves and translocated to the growing point of the plant. This product is designed to be used in dry areas and will not be used near any wet meadows, marshy areas, or riparian areas. This herbicide can be applied as a pre or post-emergent. **Matrix** is a product example. Following the completion of a forest Service Environmental Risk Assessment, Rimsulfuron will replace sulfometuron-methyl to treat annual grasses. Rimsulfuron is known to bind better to soils and has overall better environmental characteristics than sulfometuron-methyl.

Sulfometuron-methyl - Sulfometuron-methyl is a selective herbicide and will be used for pre-emergent control of annual grasses such as medusahead or cheatgrass. In some cases a mix of Sulfometuron methyl and chlorsulfuron (Landmark) will be use. This product is designed to be used in dry areas and will not be used near any wet meadows, marshy areas, or riparian areas. **Oust** is a product example. As mentioned above, this chemical will eventually be replaced by Rimsulfuron and no longer used to treat annual grasses within the project area.

Triclopyr - Triclopyr is a selective post-emergent herbicide used to control woody and broadleaf plants. It is proposed for use primarily on woody species such as saltcedar (*Tamarix ramosssissima*). Application for woody species would include cut stump, directed foliar spray or wiping. **Garlon 3A** is a product example.

Surfactants

Herbicide treatments would include the use of a surfactant to enable herbicide penetration of the plant cuticle (a thick, waxy layer present on leaves and stems of most plants). Surfactants are materials that facilitate the activity of herbicides through emulsifying, wetting, spreading or otherwise modifying the properties of liquid chemicals. Treatments would also include use of a dye to assist the applicator in efficiently treating target plants and avoiding contact with plants that have already been treated. A methylated seed oil surfactant, such as Hasten or Competitor, would be used as a surfactant and a water soluble dye, such as Highlight Blue, would be used as a dye. Both the surfactant and the dye are considered to be virtually non-toxic to humans. The use of these additives in the formulations would result in almost no increase in risk to the health and safety of the workers or public, and in fact the use of these products, particularly the dye can reduce over exposures.

MONITORING

Post-treatment monitoring will occur on all treatment sites to determine if treatment methods were successful. Level of success determinations will be commensurate with the treatment goal of the site (i.e. eradicate, control etc.). For example, if the objective was eradication, post-treatment monitoring would focus on a visual inspection of the treatment area for the presence or absence of the noxious or invasive weed species. This treatment would be considered successful when the target species is absent from its former location. Treatments designed to contain, control or suppress would be based on quantitative inspection (i.e. a reduction in percent cover or size of infestation of the noxious or invasive weed). If monitoring demonstrates that a treatment has not been effective, corrective actions (such as retreatment with the same or different method, or combination of methods) would be identified and implemented to enhance the level of success.

ANNUAL IMPLEMENTATION PROCESS

The Annual Implementation Process will include a yearly pre-treatment assessment of current weed conditions and will provide an annual plan for how, when, and where weeds will be treated. This process will include the coordination and consultation with the Forest Service interdisciplinary team as well as any appropriate staff within the U.S. Fish and Wildlife Service. The team will review up to date weed maps and proposed treatment areas and provide feedback on appropriate design features, special notifications, or other issues that may be associated with treatments. The Implementation Process will also help to prioritize treatment areas based on updated inventory information, proximity to sensitive areas, and/or the EDRR to newly discovered weed populations. The Annual Implementation Process will be discussed in more detail in the EA.

DESIGN FEATURES

The issue statements below are derived from comments received during public scoping and preliminary review and analysis from the ID team. The following are resource protection measures relevant to Forest Service Sensitive and HTNF Watch List plant species, and associated habitat that are incorporated into the Proposed Action of the CAIWMP:

Herbicide application safety:

Issue: The use of herbicide treatments may negatively affect human health and safety

1. A spill cleanup kit will be readily available whenever herbicides are transported or stored. In addition, a small containment kit would be carried by herbicide applicators to further limit potential effects in the event of equipment failure (i.e. backpack leaking).
2. In all herbicide treatment applications, the herbicide spray nozzle would be kept as close to target plants as possible (within 20 inches) in order to limit overspray and drift to non-target native plant species.

Soil/Watershed:

Issue: The use of herbicide treatments may negatively affect soil conditions and or increase the risk of contaminating watersheds through drift and ground water seepage.

3. Applicators will be briefed about the locations of water sources prior to beginning work and buffers will be flagged on the ground.
4. Mixing or application of herbicides will not occur within 100 feet of a well or spring used as a domestic water source.

5. Within 50 feet of perennial rivers, streams, lake, wet meadows, and other water bodies, including seasonally flooded areas, the preferred treatment would be manual weed removal.
6. Herbicide applications will not be conducted during rain nor immediately following rain when soil is saturated or runoff, standing water, or a heavy dew is present.
7. Application will occur only under favorable weather conditions, defined as:
    - 30% or less chance of precipitation on the day of application based upon NOAA weather forecasting If rain, showers or light rains are predicted within 48 hours, the amount of rain predicted shall be no more than ¼ inch of rain, and rain does not appear likely at the time of application.
8. Between 50 and 10 feet of a perennial waterway, herbicide application methods may only include spot spraying, dip and clip and or wicking and wiping methods.
9. Within 10 feet of a perennial waterway, only dip and clip and/or wicking and wiping methods will be used.
10. Preparation of herbicides for application, including mixing or filling of tanks or backpacks, will take place outside of Riparian Conservation Areas and more than 300 feet from surface water.

Vegetation (including rare plants):
Issue: Noxious weed treatments could potentially affect non-target native plant communities including rare plant populations. The use of herbicides and potentially other treatment activities could impact individual plants as well as populations. Modification of the plant community structure and composition could impact Sensitive plants and their habitats.

11. Where treatments occur within 500 feet of Threatened, Endangered, Candidate or Proposed, and Region 4 Forest Service Sensitive (TECPS) or HTNF Watch List plant occurrences, weed crews would be instructed in the proper identification of plant species to be avoided to ensure that individual TECPS or HTNF Watch List plants are protected.
12. No mixing and loading of herbicides would occur within occupied habitat for Forest Service Sensitive and HTNF Watch List plant species to limit the potential for herbicide spills.
13. Broadcast spray (using a truck/UTV mounted sprayers) would not occur within 500 feet of Forest Sensitive or HTNF Watch List plant occurrences unless specific alternative treatment guidelines are established by the Forest or District Botanist.
14. Directed broadcast/spot spray (using a backpack sprayer) would not occur within 100 feet of Forest Sensitive or HTNF Watch List plant occurrences unless specific alternative treatment guidelines are established by the Forest or District Botanist.
15. Herbicide treatments would not occur within 500 feet of Forest Service Sensitive bryophyte occurrences unless specific alternative treatment guidelines are established by the Forest or District Botanist.
16. To protect riparian and wet meadow vegetation communities, herbicide application in riparian corridors and wet meadows would be limited to direct foliar spray or wiping methods and spray will be directed away from native vegetation.
17. Staging areas and fire lines for prescribed burning treatments would not be constructed within known occurrences of Forest Sensitive or HTNF Watch List plant species.

18. When Forest Sensitive or HTNF Watch List plant species are within 25 feet of prescribed burning treatments, plants would be clearly identified and care taken to avoid direct impacts to individuals.
19. When Forest Sensitive or HTNF Watch List plant species are within 25 feet of digging, tarping, or mechanical treatments, plants would be clearly identified and care taken to avoid direct impacts to individuals. No buffers are required for hand pulling.
20. Where determined necessary based on habitat potential, surveys will be conducted for Forest Sensitive and HTNF Watch List plant occurrences within 500 feet of new infestations identified for chemical and biological treatment, and within 25 feet of new infestations identified for manual treatments prior to implementation.
21. Within riparian plant communities, surveys would be conducted for Forest Service Sensitive *Botrychium* species prior to any weed treatments. Any new occurrences discovered during these surveys would be clearly identified and avoided during treatment activities.

IV. Plant Species Evaluated for this Biological Evaluation

The following list includes the United States Department of Agriculture Forest Service Regional Forester's (R4) Sensitive plant species known or suspected to occur on the HTNF (USDA FS 2016a). R4 plant species additionally ranked by USFWS as Threatened, Endangered or Proposed have been excluded from this list.

*Charleston angelica (*Angelica scabrida*)

* Meadow pussytoes (*Antennaria arcuata*)

*Charleston pussytoes (*Antennaria soliceps*)

*Rosy King's sandwort (*Arenaria kingii* spp. *rosea*)

*Eastwood milkweed (*Asclepias eastwoodiana*)

*Clokey milkvetch (*Astragalus aequalis*)

Long Valley milkvetch (*Astragalus johannis-howellii*)

*Broad-pod freckled (*Astragalus lentiginosus* var. *latus*)

*Lee Canyon milkvetch (*Astragalus oophorus* var. *clokeyanus*)

Lavin's eggvetch (*Astragalus oophorus* var. *lavinii*)

*Spring Mountain milkvetch (*Astragalus remotus*)

*Lamoille Canyon milkvetch (*Astragalus robbinsii var. occidentalis*)

*Toquima milkvetch (*Astragalus toquimanus)*

*Currant milkvetch (*Astragalus uncialis*)

Bodie Hills rockcress (*Boechera (=Arabis) bodiensis*)

*Grouse Creek rockcress (*Boechera (=Arabis) falcatoria*)

*Spring Mountains rockcress (*Boechera (=Arabis) nevadensis*)

*Ophir rockcress *(Boechera (=Arabis) ophira*)

****Washoe tall rockcress (*Boechera (=Arabis) rectissima var. simulans)*

Galena Creek rockcress (*Boechera (=Arabis) rigidissima* var. *demota)*

Tiehm's rockcress (*Boechera (=Arabis) tiehmii*)

Upswept moonwort (*Botrychium ascendens)*

Dainty moonwort (*Botrychium crenulatum)*
Slender moonwort (*Botrychium lineare*)
Moosewort (*Botrychium tunux*)
Tioga Pass sedge (*Carex tiogana)*
Bodie Hills draba (*Cusickiella quadricostata)*
*Goodrich biscuitroot (*Cymopterus goodrichii)*
*Arid draba (*Draba arida)*
Tahoe draba (*Draba asterophora* var. *asterophora)*
*Wasatch Draba (*Draba brachystylis*)
*Jaeger draba (*Draba jaegeri)*
*Serpentine draba (*Draba oreibata* var. *serpentina)*
*Charleston draba (*Draba paucifructa)*
*Schell Creek draba (*Draba pennellii*)
*Nevada willowherb (*Epilobium nevadense)*
*Spring Mountain goldenweed (*Ericameria compacta)*
*Snake Mountain erigeron (*Erigeron cavernensis*)
*Sunflower Flat buckwheat *(Eriogonum douglasii* var. *elkoense)*
*Toiyabe buckwheat (*Eriogonum esmeraldense var. toiyabense*)
*Clokey buckwheat (*Eriogonum heermannii* var. *clokeyi)*
*Lewis' buckwheat (*Eriogonum lewisii*)
****Altered andesite buckwheat *(Eriogonum robustum)*
*Clokey greasebrush (*Glossopetalon clokeyi)*
*Smooth dwarf greasebrush (*Glossopetalon pungens* var. *glabra)*
Sierra Valley ivesia (*Ivesia aperta* var. *aperta)*
Dog Valley ivesia (*Ivesia aperta* var. *canina)*
*Charleston ivesia (*Ivesia cryptocaulis)*
*Jaeger ivesia (*Ivesia jaegeri)*
Plumas ivesia (*Ivesia sericoleuca)*
*Fourpetal jamesia (*Jamesia tetrapetala*)
*Grimes' lathyrus (*Lathyrus grimesii*)
*Payson's bladderpod (*Lesquerella paysonii*)
*Maguire's lewisia (*Lewisia maguirei*)
Three-ranked hump-moss (*Meesia triquetra*)
Shevock's bristle-moss (*Orthotrichum shevockii*)
Spjut's bristle-moss (*Orthotrichum spjutii*)
*Dune penstemon (*Penstemon arenarius)*
*Elegant penstemon (*Penstemon concinnus*)
*Charleston beardtongue (*Penstemon leiophyllus var. keckii*)
*Mt. Moriah penstemon (*Penstemon moriahensis*)
*Bashful penstemon (*Penstemon pudicus*)

*Rhizome beardtongue (*Penstemon rhizomatosus*)

****Wassuk beardtongue (*Penstemon rubicundus*)

*Jaeger beardtongue (*Penstemon thompsoniae ssp. jaegeri*)

*Inconspicuous phacelia (*Phacelia inconspicua*)

Mono phacelia (*Phacelia monoensis)*

Whitebark pine *(Pinus albicaulis)*

**Altered andesite popcorn flower (*Plagiobothrys glomeratus*)

Marsh's bluegrass (*Poa abbreviata* var. *marshii)*

White Mountain skypilot (*Polemonium chartaceum*)

William's combleaf (*Polyctenium williamsiae)*

*Sagebrush cinquefoil (*Potentilla johnstonii*)

*Ruby Mountain primrose (*Primula capillaris*)

*Nevada primrose (*Primula cusickiana* var. *nevadensis*)

Mono ragwort (*Senecio pattersonensis)*

*Clokey silene (*Silene clokeyi)*

*Nachlinger's catchfly (*Silene nachlingerae*)

*Railroad Valley globemallow (*Sphaeralcea caespitosa var. williamsiae)*

*Low sphaeromeria (*Sphaeromeria compacta)*

Masonic Mountain jewelflower (*Streptanthus oliganthus)*

*Charleston kittentails (*Synthyris ranunculina)*

*Alpine goldenweed (*Tonetus alpinus)*

*Charleston ground daisy (*Towsendia jonesii* var. *tumulosa)*

*Currant Summit clover (*Trifolium andinum var. podocephalum)*

*Leiberg's clover (*Trifolium leibergii)*

*Rollins clover *(Trifolium macilentum* var. *rollinsii)*

*Charleston violet (*Viola charlestonensis)*

*Rock violet (*Viola lithion*)

***It has been determined after reviewing the Toiyabe National Forest Sensitive Plants Field Guide (Weixelman 1991), California plant databases: California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) Rare and Endangered Plant Inventory, and the Nevada Natural Heritage Program (NNHP) Database that the habitat type is not present within the project area and/or that these plant species do not occur nor have the probability of occurring within the CAIWMP area. In addition, plant species marked with (**) are species currently recognized as endemic to Nevada and not expected to occur within the CAIWMP. Level of past survey efforts and quantity and quality of existing information were factored into determining the probability of species occurring in the project area. Thus, for species which have no probability of occurring in the CAIWMP area, there will be **no direct, indirect, or cumulative impacts** to these species from the proposed project and no further analysis will be conducted.*

V. Analysis Process and Affected Environment

Affected Environment

The project area includes approximately 693,721 acres across nine California counties and two Ranger Districts, Carson and Bridgeport. Given the size of the project area, elevation and habitat are variable. The dominant vegetation across the project area includes alpine-dwarf shrub, annual grassland, bitterbrush, barrens, eastside pine, sagebrush, pinyon-juniper, montane chaparral, low sagebrush and montane mixed conifer. However, the vegetation within some of these habitats is not expected to be impacted by the CAIWMP since there are no known weed infestations and typically weed occurrences in these areas are rare, such as in alpine-dwarf shrub and barrens. The majority of the project area is relatively free of non-native invasive plant species with the exception of isolated infestations. Under this project, the HTNF would primarily focus on 12 invasive plant species which currently occupy approximately 1,172 acres of HTNF lands, plus an unknown number of acres infested with cheatgrass (Table 3). Currently there are 20 HTNF Sensitive plant species known to occur within the CAIWMP and an additional five species with potential habitat (Table 4). However, Dog Valley ivesia (*Ivesia aperta* var. *canina*) is the only plant known to occur within 500 feet of any HTNF documented noxious weed infestations, although suitable habitat exists for moonwort species (*Botrychium* spp.) where riparian noxious weeds are known to occur. One additional rare plant species, Webber's ivesia (*Ivesia webberi*), which is currently listed as Threatened by the US Department of the Interior, Fish and Wildlife Service (USDI FWS) is analyzed in the Biological Assessment for this project (see the CAIWMP Biological Assessment for effects and determinations to this species).

Analysis Process

Background Research - For the purpose of this analysis, aerial photos, soil maps, GIS coverages including the USFS Natural Resource Information System (NRIS) database (USDA FS 2016b), and other existing documents were reviewed to determine suitable habitat potential for Region 4 Forest Service Sensitive plant species. The California Natural Diversity Database (CNDDB 2016) and Nevada Natural Heritage Program (NNHP 2016) database and records were examined to identify any known locations or potential habitat that may occur within or adjacent to the project boundary. The CAIWMP area has an extensive management history including grazing, timber harvest, mining, wildfire, and recreation. Historical records for many of these activities/events are on file at the Carson and Bridgeport Ranger Districts and were reviewed for the analysis. Specific searches for rare plants associated with riparian communities have not been systematically completed across the districts. Some rare plant surveys in aspen habitat have occurred in conjunction with other projects. Invasive plant species located within 500 feet of known HTNF Sensitive plant occurrences or within suitable habitat for *Botrychium* spp. were considered within the occupied habitat of these species for the purposes of this analysis.

ID Team Meetings: During the planning process, several ID Team meetings occurred to develop a proposed action that addressed both public and internal concerns. The ID Team consisted of the Recreation Manager, Archeologist, Wildlife Biologist and Weed manager, Forest Botanist, District Hydrologist and a NEPA planner. Individual specialists conducted specific assessments for their resource area which are described below for plants and wildlife.

Plants: Although plant surveys were not specifically conducted for this project, survey data has been gathered for other projects in the past which have provided valuable information on Sensitive plant and non-native invasive plant locations within the project area.

VI. Region 4 Forest Service Sensitive Plant Species Accounts

Region 4 Forest Service Sensitive plant species which are known or have the potential to occur within the CAIWMP area are listed in Table 4.

Table 4. Region 4 Forest Service Sensitive plant species that are known or have the potential to occur within the California Integrated Weed Management Project Area.

Species & Common Name	Status*	Habitat	HP*	K*	Comments
Astragalus johannis-howellii Long Valley milkvetch	FSS	Sandy rhyolitic soils on flats and gentle slopes; usually found in swales of former or present hot spring activity. In sagebrush communities. From 6,700 to 8,400 ft.	yes	yes	Known from the Bridgeport RD within California. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Astragalus oophorus var. *lavinii* Lavin's eggvetch	FSS	Relatively barren slopes, knolls, badlands, or outcrops derived from volcanic ash or carbonate; usually on northeast to southeast aspects. In sagebrush or pinyon-juniper plant communities. From 5,700 to 7,467 ft.	yes	yes	Known from the Bridgeport RD within California. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Boechera (=Arabis) bodiensis Bodie Hills rockcress	FSS	Dry, open, rocky, high or north-facing slopes or exposed summits of granitic or rhyolitic material. From 6,720 to 9,970 ft.	yes	yes	Known from the Bridgeport Ranger District; Sweetwater, Bodie Hills, Wassuk Ranges, Brawley Peaks and Sierra Nevada. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Boechera (=Arabis) rigidissima var. *demote* Galena Creek rockcress	FSS	The habitat includes sandy to rocky soils or outcrops derived from granitic or volcanic materials, mostly on moderate to steep northerly aspects. Often found in drainage ways, near meadow edges or in other moisture accumulating microsites. Associated forest communities include fir, pine and aspen; elevation above 7,500 ft. (Morefield 2001).	yes	no	Known from the Carson Ranger District. Referenced distribution of this plant as restricted to the Carson Range (Tiehm 1989). No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Boechera (=Arabis) tiehmii Tiehm's rockcress	FSS	Associated with steep outcrops of weathering andesitic volcanic and metavolcanic deposits, sometimes on adjacent decomposed granite or carbonates, on ridgetops or on steep, mostly west to north aspects; 9820 to 10,560 ft. (Morefield 2001).	yes	yes	Known from the Carson and Bridgeport Ranger Districts. Tiehm's rockcress is associated with high elevations and is known form the Mt. Rose Wilderness, Hoover Wilderness, and Tioga Pass summit area. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Botrychium ascendens upswept moonwort	FSS	Botrychiums share similar preferences in habitat, i.e. wet or moist soils such as marshes, meadows, and along the edges of lakes and streams at elevations between 4,700 and 9,000 ft. They generally occur with mosses, grasses, sedges, rushes, and other riparian vegetation.	yes	yes	Known from the Bridgeport RD, with potential on Carson RD. *Botrychium* ssp. will primarily be discussed relative to potential habitat. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Botrychium crenulatum dainty moonwort	FSS	See *B. ascendens*	yes	yes	See *B. ascendens*
Botrychium lineare slender moonwort	FSS	See *B. ascendens*	yes	no	Potential to occur on the Bridgeport and Carson Ranger Districts. Known from areas adjacent to these districts. *Botrychium* ssp. will primarily be discussed relative to potential habitat. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Botrychium tunux moosewort	FSS	See *B. ascendens*	yes	yes	Known from the Hoover Wilderness on the Bridgeport RD. Potential to occur on the Carson RD. *Botrychium* spp. will primarily be discussed relative to potential habitat. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).

Species & Common Name	Status*	Habitat	HP*	K*	Comments
Carex tiogana Tioga Pass sedge	FSS	On terraces next to lakes, meadows, and other mesic site; in alpine plant communities. Can occur with *Salix nivalis*. From 10,100 to 10,900 ft.	yes	yes	Known from Bridgeport RD (Sierra Nevada) with potential on Carson RD. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Cusickiella quadricostata Bodie Hills draba	FSS	Clay or rocky soils on flats and rolling hills. Usually found at middle to high mountain on flats, ridges, and windswept slopes. Great Basin scrub including low sagebrush, grasslands, pinyon-juniper, mountain mahogany. From 6,000 to 8,500 ft.	yes	yes	Known from Bridgeport RD (Douglas, *Lyon*, Mineral, and Mono Counties). No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Draba asterophora var. *asterophora* Tahoe draba	FSS	This plant is found in rock crevices and exposed talus and boulder slopes with minimal ground cover, and a sparse understory. The Tahoe star draba occurs at high elevations between 8,000 to 10,200 ft. on north-east facing slopes (Baldwin 2012). Soils are typically of granitic parent material but the plant may also be found in areas of mixed granitic and volcanic origin.	yes	yes	Known from the Carson Ranger District with potential on Bridgeport RD. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Ivesia aperta var. *aperta* Sierra Valley mouse-tail	FSS	Habitat occurs on sites which are vernally saturated such as meadow flats and borders and ephemeral channels. All sites retain moisture longer than the surrounding soils. These sites may be located in Great Basin scrub, lower montane forests, pinyon-juniper woodlands and vernal pools. The plant occurs in an open-canopy plant association where the competition for light and moisture is relatively low. (Aitken 2008). From 6,460 to 7,300 ft.	yes	no	Known from the Carson RD within Nevada. In California, the majority of the Sierra Valley mouse-tail populations occur within the Sierra Valley. In NV. The known populations tend at a higher elevation in more remote locations (Witham 2000). No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Ivesia aperta var. *canina* Dog Valley Ivesia	FSS	Endemic to Dog Valley, the Ivesia occurs on vernally saturated sites. It is associated with meadow flats, borders of gently sloping openings, and ephemeral channels including abandoned irrigation ditches. Soils include a surface layer that is sandy loam and slightly acidic. Subsoils are a clay loam derived from weathered to slightly fractured andesitic rock. From 4,800 to 6,000 ft	yes	yes	Known from the Carson RD. Two non-native invasive plant species (bull thistle and musk thistle) co-occur with this *Ivesia aperta* var. *canina* near Dog Valley Campground.
Ivesia sericoleuca Plumas ivesia	FSS	Associated with seasonally wet meadows, meadow ecotones, terraces and toe slopes on soils which are primarily volcanic in origin. The plant has not been located on granitic soils. All of the associated soil types have slow permeability and incur periodic saturation from fluctuating water tables, and have subterranean flow associated with seeps and snow melt (Scott 1995). From 6,300 to 7,800 ft.	yes	no	Plumas ivesia is known from Plumas, Sierra, Nevada, and Placer Counties in CA. Several populations are mixed with Sierra Valley ivesia, however the majority of the distribution for Sierra Valley ivesia lies to the east (Ertter 1989). To date, the Plumas ivesia has not been documented as occurring on the Carson Ranger District. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Meesia triquetra three-ranked hump-moss	FSS	Three –ranked humpmoss is associated with fens within the upper montane coniferous forest within the Sierra Nevada Bioregion, (4,250 – 9,700 ft.).Fens are a unique peat forming wetland type dependent on the interaction of hydrological regime and landforms. Associated species include; lodgepole pine, sundew and mosses such as Sphagnum (Dillingham 2005).	yes	yes	Three-ranked humpmoss is known from a fen site on the Carson Ranger District in the vicinity of Tahoe Meadows; with potential on the Bridgeport RD. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Orthotrichum shevockii Shevock's bristle-moss	FSS	Found on underhangs or crevices of granitic rock within pinyon – juniper to Jeffrey Pine forests. It grows in filtered light (Lewinsky-Haapasaari and Norris 1998). From 3,600 to 5,250 ft.	yes	yes	A rare endemic known from the Eastern to Central Sierra Nevada and the Western edge of Nevada. Known from the Bridgeport RD with potential in the Carson RD. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).

Species & Common Name	Status*	Habitat	HP*	K*	Comments
Orthotrichum spjutii Spjut's bristle-moss	FSS	Found in shaded forests near stream beds and in canyons, usually in mountainous areas, growing on deciduous trees and rarely on shaded rocks; from 6,890 to 8,500 ft.	yes	yes	Endemic to California. Known from the Bridgport RD. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Phacelia monoensis Mono phacelia	FSS	Alkaline, barren or sparsely vegetated shrink-swell clays mostly on andesitic origin, on various slopes and aspects. Often found in disturbed areas in habitat and eroding badlands. Pinyon-juniper, low sagebrush and mountain sagebrush zones from 6,000 to 9,000 ft.	yes	yes	Known from Bridgeport RD (*Esmeralda*, Lyon, Mineral, Nye, and Mono County). No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Pinus albicaulis whitebark pine	FSS C	Hardy conifer that tolerates poor soils, steep slopes and windy exposures. Trees in alpine settings are often krumholtzed in habit and are present as patchy stands. Upper red fir forest; subalpine to timberline from 6,500 to 11,000 ft.	yes	yes	Known from both the Bridgeport and Carson Ranger Districts. No non-native invasive plant infestations are currently known from within 500 ft of any known occurrences of this species (USDA 2016).
Poa abbreviata var. *marshii* Marsh's bluegrass	FSS	Found in soil pocks in alpine scree, talus, boulder, fell fields, and loose quartzite; above 11,600 ft.	yes	no	Known from the White Mountains in Mono County. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Polemonium chartaceum White Mountain skypilot	FSS	Alpine boulder and rock fields and subalpine coniferous forest on rocky, serpentine, granitic, or volcanic soils. From 5,900 to 13,700 ft.	yes	yes	Known from the Bridgeport RD in the Sweetwater Range. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Polyctenium williamsiae William's combleaf	FSS	Relatively barren sandy to sandy-clay or mud margins and bottoms of non-alkaline seasonal lakes and playas perched over siliceous volcanic bedrock in the sagebrush, pinyon-juniper, and mountain sagebrush zones. Rarely, the plant is found in seasonally wet drainages near such lakes (Holland 2002). From 5,600 to 8,900 ft.	yes	yes	Known from the Bridgeport Ranger District. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Senecio pattersonensis Mono ragwort	FSS	Open, rocky habitats, including talus slopes and gravelly ridges at and above timberline and alpine fell-field areas. From 9,500 to 12,200 ft.	yes	yes	Known from Bridgeport RD (Sierra Nevada and east of Sierra). No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).
Streptanthus oliganthus Masonic Mountain jewelflower	FSS	Found on rocky slopes or talus, on flat areas, in ravines, and in canyon bottoms in sandy or gravelly soil of decayed granite or decomposing volcanic rock. Sometimes associated with large outcroppings. Pinyon-juniper, sagebrush-grass, and Jeffrey pine zones from 6,400 to 10,000 ft.	yes	yes	Known from Bridgeport RD. No non-native invasive plant infestations are known from within 500 ft of any known occurrences of this species (USDA 2016).

* Status explanations: C - USDI FWS Candidate species; FSS - Regional Forester's Sensitive Plant List
* HP, Potential habitat for rare plants present within the project area.
* K, Rare plant occurrence documented within the project area.

Long Valley milkvetch (*Astragalus johannis-howellii)*

Long Valley milkvetch is designated as a Sensitive species in Forest Service Region 4, a Bureau of Land Management (BLM) Sensitive species, and ranked as list 1B in California (CNPS 2016). Currently there are 19 known occurrences in California, all of which are located in Mono County (CNDDB 2016). This species has been found at elevations ranging from 6,690 to 8,300 ft within California and Nevada (CNPS 2016). The Long Valley milkvetch is associated with sandy, rhyolitic soils on flats and gentle slopes in sagebrush scrub. On the HTNF this species is known from the Bridgeport RD within Nevada.

Potential threats to this species include mineral exploration and associated developments, Off-Highway Vehicle (OHV) use, and effects from livestock grazing in the form of trampling. There

has been no formal monitoring of this species on the Bridgeport Ranger District; therefore, long- or short-term trends are currently unknown.

Lavin's eggvetch, *(Astragalus oophorus* var. *lavinii)*
Lavin's egg vetch is designated as a Sensitive species in Forest Service Region 4, a Bureau of Land Management (BLM) Sensitive species, and ranked as list 1B in California (CNPS 2016). Currently there are two documented occurrences of this species in California (CNDDB 2016), one of which is known from the Bridgeport RD of the HTNF in the Bodie Hills of Mono County. Lavin's egg vetch is associated with open, dry, barren slopes, knolls, or outcrops, derived from volcanic ash or carbonate, usually on northeast to southeast aspects within pinyon juniper communities

Threats listed for this species include mineral exploration and associated developments, road construction and maintenance (Morefield 2001). However, the sparsely vegetated sites where Lavin's egg vetch is found are not conducive to grazing. These areas are more prone to impacts from livestock trailing through habitat. There has been no formal monitoring of this species on the Bridgeport Ranger District; therefore, long- or short-term trends are currently unknown.

Bodie Hills rockcress, (*Boechera bodiensis*)
Bodie Hills rockcress is designated as a sensitive species for both Forest Service Regions 4 and 5 and occurs on the Humboldt-Toiyabe and Inyo National Forests respectively. This species is a list 1B by the California Native Plant Society. Currently there are 19 documented occurrences in California, found within Fresno, Inyo, Mono and Tulare Counties (CNDDB 2016). On the HTNF, Bodie Hills rockcress is known from the Bridgeport RD.

In general the preferred habitat for *Boechera bodiensis* is dry, open, rocky, high, and north-facing slopes or exposed summits of granitic or rhyolitic material on moisture accumulating micro-sites in sagebrush associations (Morefield 1994). Micro- habitat features include crevices, among cobble and boulders, at rock bases, or under tree or shrub drip-lines. This species occurs at elevations ranging from 6,840 to 13415 ft, generally on summits or along ridges at most known sites. Occupied sites are sometimes surrounded by pinyon-juniper woodland or subalpine conifer forest (Morefield 1994).

Habitat has been impacted at several Nevada sites by road building and mineral development (Morefield 1994). These impacts have also been noted at California sites with the addition of geothermal drilling and off-road vehicle use (Dr. Tim Messick as documented in Morefield 1994). The most severe impacts to the plant are those which permanently alter the substrate. Bodie Hills rockcress grows in habitats which may be utilized by livestock, impacts may occur where concentrated sheep use of an area is common either through closed herding practices or bedding grounds (USDA Forest Service 2001). There has been no formal monitoring of this species on the Bridgeport Ranger District; therefore, long- or short-term trends are currently unknown.

Tiehm's rockcress (*Boechera tiehmii*)
Tiehm's rockcress designated as a Sensitive species for both Forest Service Regions 4 and 5 and is known from both the Carson and Bridgeport Ranger Districts of the HTNF, and is ranked List 1B by CNPS. On the Bridgeport RD, there is one known occurrence within California located on a ridge between Dunderberg and Excelsior Peaks. Within the Carson RD this species is known from the Mt. Rose Wilderness in Washoe County, Nevada (NNHP 2016). Currently there are 9 known occurrences within California, all of which are located in Mono County (CNDDB 2016).

Tiehm's rockcress occurs on steep outcrops, talus and scree of weathering andesitic volcanic and metavolcanic deposits, sometimes on adjacent decomposed granite or carbonates, at elevations ranging from 9,820 to 10,560 ft. This taxon has been found on ridge tops or on steep, mostly west or north facing slopes and frequently in dry drainages with a sparse cover of other subalpine or alpine species.

Galena Creek rockcress *(Boechera rigidissima var. demota)*
This taxon is designated as a Sensitive species for both Forest Service Regions 4 and 5 and is known from the HTNF only within Nevada and the Lake Tahoe Basin Management Unit (LTBMU) in California. Currently there are seven extant occurrences within El Dorado and Placer Counties in California, where it is ranked List 1B and considered to be threatened by timber harvest and fuels reduction projects (CNPS 2016). However, based on habitat observations of known occurrences within Nevada, it has been suggested that this species may tolerate a moderate amount of disturbance, as its preferred habitat is naturally somewhat unstable (NNHP 2016).

Galena Creek rockcress occurs in fairly open stands, on sandy to rocky soils or outcrops derived from granitic or volcanic parent materials. It has primarily been found on moderate to steep slopes with northerly aspects, often in drainages, near meadow edges or in other moisture accumulating microsites.

Upswept, Dainty and Slender Moonworts, and Moosewort
Botrychiums, also known as moonworts and mooseworts, are associated with wet to moist meadow type habitats, (a designation which is inclusive of small springs, seeps and riparian vegetation) lakesides, and high elevation cirque habitats. Upswept, dainty and slender moonworts and the moosewort have been listed as sensitive across the western Forest Service Regions based on rarity. Riparian habitat on the HTNF has not been exhaustively surveyed; therefore, the presence or absence of Botrychiums within suitable habitat across the forest has not been determined at present.

Understanding the lifecycle of moonworts, which is unique compared to other flowering plants or ferns, is important for effectively managing the species (Johnson-Grohl et.al. 2002a.). Spores from the moonworts are produced above the ground where they filter into the soil and germinate underground. Following germination, a significant portion of the moonwort life cycle is then spent below the ground where reproduction occurs and the offspring can remain for a number of years (Johnson-Grohl et.al. 2002b). Often, the density of below-ground plants exceeds the sporophytes above ground. This below-ground population acts as a reservoir for above ground plants that may be impacted from disturbance or other unfavorable environmental conditions. Although above ground populations of moonworts are subject to impacts from activities such as fire, grazing, herbicides, and timber harvest, these plants are resilient and usually recover following disturbance (Johnson-Grohl et.al. 2002a). Because reproduction and juvenile recruitment occur below the ground, protecting the below ground environment, in particular the mycorrhizal relationship, is critical to the overall survivorship of these species (Johnson-Grohl et.al. 2002a,b).

Potential impacts and threats to moonworts and moosewort include: noxious weed invasion, mechanical vegetation treatments and fuels reduction activities, prescribed fire, reforestation, grazing and stock trampling, catastrophic fire as well as changes in vegetation from the lack of

fire, fire suppression activities, minerals development, flooding, hydrologic alterations, and plant collectors (USDA 2001).

Upswept Moonwort *(Botrychium ascendens)*
Upswept moonwort is designated as a Sensitive species in both Forest Service Regions 4 and 5. It is listed by the U.S. Fish and Wildlife Service as a Species of Concern. In California, upswept moonwort is known from 47 occurrences, at elevations ranging between 4,900 and 9,000 ft, in Mono, El Dorado, Tehama, Modoc, Plumas and Butte counties (CNDDB, 2016). The Mono County occurrence of this species is documented from the Hoover Wilderness on the Bridgeport Ranger District. Associated habitat for upswept moonwort includes grassy fields, near streams in coniferous woods, and meadows. There has been no formal monitoring of this species on the Bridgeport or Carson Ranger Districts of the HTNF; therefore, long- or short-term trends are currently unknown.

Dainty Moonwort *(Botrychium crenulatum)*
Dainty moonwort is a Sensitive species in both Forest Service Regions 4 and 5. The U.S. Fish and Wildlife Service have listed this plant as a Species of Concern. Currently, there are 99 known occurrences of this species within California, found in scattered locations on multiple forests across the state, including the HTNF (CNDDB 2016). This species is known from the Bridgeport RD in the Sweetwater Range and the Carson RD on the west slope of the Carson Range. There has been no formal monitoring of this species on the Bridgeport or Carson Ranger Districts of the HTNF; therefore, long- or short-term trends are currently unknown.

Habitat for this plant includes lower montane coniferous forests, wet meadows, marshes, bog-fen habitat types and springs (CNPS 2016, Morefield 2001). The range for dainty moonwort has been documented from Arizona, Idaho, Montana, Wyoming, Washington, Utah, Oregon, Nevada, California, British Columbia and Alberta (USDA 2016).

Slender Moonwort *(Botrychium lineare)*
In 2001, slender moonwort was designated a candidate species for listing under the Endangered Species Act. It was determined that listing the species was warranted but precluded by other higher priority actions (USDI FWS 2001). This species is listed as Sensitive for both Forest Service Regions 4 and 5, and has been placed on List 1B by the California Native Plant Society.

Currently there are five known occurrences of this species within California (CNDDB 2016). One of these occurrences is located on the HTNF in the Virginia Lakes area. Relatively recently two additional locations of slender moonwort have been documented in the Bodie Hills area in Mono County, CA; one on land administered by the Bureau of Land Management, and the other on private property (Halford, 2007). These areas lie within five miles of the National Forest boundary. There has been no formal monitoring of this species on the Bridgeport or Carson Ranger Districts of the HTNF; therefore, long- or short-term trends are currently unknown.

Moosewort *(Botrychium tunex)*
Moosewort is listed as Sensitive for several of the western regions of the Forest Service, including Regions 4 and 5. There are two documented occurrences of this species in California, one within Yosemite National Park (CNDDB 2016) and one within the Hoover Wilderness on the HTNF (USFS 2016).

The moosewort was first described from coastal Alaska growing on beach sand deposits sparsely to densely vegetated by bryophytes and herbaceous plants (Farrar 2004). Within mountain

habitats this species occurs on sparsely vegetated alpine scree slopes; moosewort has been described from mountain habitats in both Alaska and Colorado.

Tioga Pass sedge (*Carex tiogana*)
This graminoid species is endemic to California, known from just four occurrences in Mono County, ranked List 1B and is considered to be threatened by recreational foot traffic (CNPS 2016). This taxon is designated as a Region 4 Forest Service Sensitive species and occurs on the Bridgeport RD of the HTNF near the outlet of Cooney Lake, and there is potential habitat for this species on the Carson RD.

Tioga Pass sedge is found on terraces next to lakes, meadows and other mesic sites at elevations ranging from 10,100 to 10,900 ft. This species can co-occur with snow willow (*Salix nivalis*). Potential threats to the longevity of this species include sheep grazing and effects from trampling by recreational users.

Bodie Hills draba (*Cusickiella quadricostata)*
This species is designated as a Sensitive species by the Forest Service in Region 4 and occurs on the Bridgeport RD of the HTNF. The global distribution for Bodie Hills draba includes Douglas, Lyon, and Mineral Counties in Nevada, and Mono County, California. Bodie Hills draba has been recorded from 6 sites in Nevada and 28 sites from California. There are 17 documented populations on the Bridgeport RD, primarily known from the Bodie Hills, Sweetwater Range and vicinity of Masonic Mountain.

This species occurs on clay soils at elevations ranging from 6,000 to 9,200 feet. Bodie Hills draba is found in a number of plant communities including low sagebrush grasslands, pinyon-juniper woodlands, big sagebrush grasslands and mountain mahogany woodlands. Habitat for this species is usually found at middle to high mountains on flats, ridges and windswept side-slopes.

Recreation and mining activities have impacted plant populations and habitat. Several populations of Bodie Hills draba on the Bridgeport Ranger District are bisected by roads Bodie Hills draba also occurs within habitats which may be impacted by livestock grazing activities. Livestock use within occupied draba habitat is typically associated with trailing and not using the plant as forage. In most situations, livestock grazing is generally light due to the habitat in which this species is found; such as pinyon-juniper woodland types or open low sagebrush with low forage values.

Tahoe draba (*Draba asterophora ssp. asterophora*)
This taxon is narrowly distributed in Washoe County, Nevada, and El Dorado and Alpine counties, California, with a disjunct historical occurrence in Mono County, California. This species is a Region 4 Sensitive plant and listed as 1B by the California Native Plant Society.

Currently there are 11 known occurrences within California, one of which is located on HTNF lands in the vicinity of Jobs Sister in the Carson Range and there are a handful of historic observations on the HTNF near Sonora Pass and Carson Pass which have not been confirmed (CNDDB 2016).

Tahoe draba is found in granite rock crevices, on talus, scree or on rocky decomposed granite or volcanic soils on steep north or east facing slopes. It typically occurs on barrens and rocky areas with whitebark pine, werstern hemlock and true firs. As an alpine perennial, very little reproduction from seed is known to occur; therefore, individual long-lived plants are important

for long-term species survival.

This species is small in stature and susceptible to burial where it occurs on loose soils. Primary threats to this species include ski area development and maintenance, hiking trail construction and use, equestrian use, and utility line construction.

Sierra Valley ivesia (*Ivesia aperta* var. *aperta*)
Sierra Valley ivesia is known to occur in Plumas and Sierra counties in California and Storey and Washoe counties in Nevada. It is on the Sensitive species list for both USFS Regions 4 and 5, and is ranked List 1B by CNPS. Currently there are 49 known occurrences of this species within California (CNDDB 2016). On the HTNF this species is only known in Nevada, from the Carson and Virginia ranges and on Peavine Mountain (Morefield 2001).

Sierra Valley ivesia grows on shallow, vernally saturated, slowly draining, sandy to rocky clay soils derived from mostly andesitic volcanic rock or alluvium on benches and flats in meadows, seeps, intermittent drainages, etc., in the yellow-pine, mountain sagebrush, and mountain mahogany zones. It occurs in areas where the soil is saturated in the spring and is dependent on wetland margin areas in Nevada. In California this species is known to occur at elevations ranging from 4,855 to 7,545 ft. (CNPS 2016).

Sierra Valley ivesia can be impacted by road development and maintenance and off road vehicle use. It is vulnerable to fire suppression activities, drying of habitat by water diversions, and invasive plant colonization (Witham 2000).

Dog Valley ivesia (*Ivesia aperta* var. *canina*)
This species is endemic to Dog Valley, situated within Sierra County, California and Washoe County, Nevada (NNHP 2016); northwest of Verdi, Nevada. There are five known occurrences of this species within California, all of which are located on the HTNF (CNDDB 2016), and one occurrence within Nevada (NNHP 2016). Dog Valley ivesia is a Region 4 Forest Service Sensitive plant and ranked as List 1B by CNPS.

Dog Valley ivesia occurs on alluvial fans associated with the main meadow in Dog Valley, in a small meadow adjacent to Dog Valley Campground, and on lower hill slopes in open Ponderosa pine forest. Dog Valley ivesia exist on mostly flat slopes (0-20%) and appear to thrive in full sun (ibid).

Current threats to Dog Valley ivesia include the invasion of non-native grasses which compete for resources, encroaching conifers into meadows which also compete for resources as well as provide detrimental shading, and illegal OHV activity in the meadows. In some areas, competition with grasses may be reducing the density of Dog Valley ivesia populations. Illegal vehicle tracks were observed in the center of the Dog Valley ivesia population near the Dog Valley Campground and non-native grasses are prolific in the main Dog Valley meadow. The sub-population which is located adjacent to the campground is unique in that a non-native winter annual, bulbous bluegrass has not been found in the vicinity. Other sub-populations of the Dog Valley ivesia contain varying levels of bulbous bluegrass infestation. Within the CAIWMP, there is one Dog Valley ivesia population which co-occurs with both bull thistle and musk thistle infestations.

Plumas ivesia (*Ivesia sericoleuca*)
Plumas ivesia is a California endemic species known to occur on the east side of the Sierra Nevada Range. Currently there are 67 occurrences known from Lassen, Nevada, Placer, Plumas

and Sierra Counties in California (CNDDB 2016). This species is ranked as List 1B by CNPS and is on the Region 4 Forest Service Sensitive plant list; however, no known locations of Plumas ivesia occur on the HTNF. Both Plumas and Sierra Valley ivesia have similar habitat requirements and in some locations in California, overlap in their distribution (USDA 1992).

One difference between the two is the tendency for Plumas ivesia to grow in colder, wetter portions of meadows where Sierra Valley ivesia tends to grow on the dryer, warmer side (ibid).

Plumas ivesia occurs in vernally wet meadows and alkaline flats within the sagebrush zone from 4,300 to 7,216 feet (ibid). This species also occurs in dry meadows and openings in sagebrush scrub and appears to be most successful growing in full sun, on gentle slopes where grasses and other herbaceous species are present (USDA 1992). Where this species has been observed in California, high densities of sagebrush and bitterbrush generally inhibit the establishment of Plumas ivesia populations and limit their expansion (USDA 1992).

The main threats to this plant include grazing and off-road vehicle use. Potential threats to Plumas ivesia are development, timber harvesting, fire suppression, hydrological alterations, erosion and road maintenance (CNDDB 2016).

Three-ranked hump-moss (*Meesia triquetra*)

Three-ranked hump-moss has a circumboreal range, occurring in northern Europe, northern Asia, Greenland, Canada, and the United States. The moss is listed as Sensitive for Forest Service Region 4. This species was recently dropped from the Region 5 Sensitive list in 2012 due to the large number of new occurrences discovered within Northern California over the past decade. Three-ranked hump-moss is considered uncommon and is limited in its distribution by habitat availability due to its association with wet meadow, fen and bog habitats. Six documented occurrences are known from fens within the LTBMU. The Grass Lake location is adjacent to the HTNF boundary in the vicinity of Luther Pass. Three-ranked hump-moss is known from a fen located on the Carson RD within the vicinity of Tahoe Meadows.

In California, *Meesia triquetra* occurs in wetland sites, specifically within fens and wet meadows of upper montane coniferous forest at elevations ranging from 4,260 to 9,686 ft. Fens are peat forming wetlands, supported by nearly constant groundwater inflow (Bedford and Godwin 2003). Their perennial saturation creates oxygen-deprived soils with very low rates of decomposition that allow the accumulation of organic matter produced by wetland plants. These peat forming systems require thousands of years to develop and cannot easily be restored once destroyed (Weixelman and Cooper 2009). Common associated species include lodgepole pine, *Vaccinium* spp., sundew and mosses such as *Sphagnum* and *Aulacomnium palustre*.

Threats to three-ranked hump-moss include alteration to the fen and wet meadow habitats where it occurs. This can include alterations to the hydrology of the site or adjacent areas. Water diversions, ditches and roads have significant impacts to fen integrity (Weixelman and Cooper 2009). Livestock management can impact fens and wet meadows by trampling and compacting peat which can create gullies and headcuts which often alter hydrologic function within these habitats. Invasion by non-native plants including Timothy and Canada thistle can reduce plant diversity within fens and wet meadows and eventually degrade habitat for three- ranked hump-moss.

Shevock's bristle-moss (*Orthotrichum shevockii*)
Shevock's bristle-moss is known from the Eastern to Central Sierra Nevada Mountains of California and the Western edge of Nevada. More specifically the moss has been described from Kern County including a location on the Sequoia National Forest and in Mono County where two occurrences have been discovered on the Bridgeport RD of the HTNF. Within the Carson Range, the moss has been recorded on the west slope adjacent to the Chimney Rock Beach and also in the vicinity of Spooner Summit on lands administered by the LTBMU. Shevock's bristle-moss is a Sensitive species for Forest Service Regions 4 and 5, as well as the Bureau of Land Management (BLM) in California.

Shevock's bristle-moss occurs on the under hangs or within the crevices of granitic boulders within both pinyon – juniper woodlands and Jeffrey pine forest. The moss is recognized as occurring within extremely dry environments (Haapasaari and Norris 1998). Its location on the rock surface is within a setting of diffused versus direct light where the bristle-moss forms small patches or turfs. This species is known to occur within elevations ranging from 2,461 to 6,890 ft.

Primary impacts to the moss include boulder sales, rock climbing, habitat alterations within the plant community which disrupt the boulder that the moss occurs on, and fuels activities, especially burning immediately adjacent to Shevock's bristle moss.

Spjut's bristle-moss (*Orthotrichum spjutii)*
Spjut's bristle-moss is a California endemic species currently known from Mono and Tulare Counties (CNDDB 2016). This species is ranked List 1B by CNPS and is on the Region 4 Forest Service Sensitive species list. Spjut's bristle-moss is known to occur on the Bridgeport RD of the HTNF near Sonora Pass.

Spjut's bristle-moss occurs at elevations ranging from 6,890 to 8,500 ft in lower montane coniferous forest, pinyon-juniper woodland, and subalpine and upper montane coniferous forests. It is found in shaded forests near stream beds and in canyons, usually in mountainous areas, growing on deciduous trees and rarely on shaded rocks. Potential threats to Spjut's bristle-moss include wildland fire and fuels reduction activities.

Mono Phacelia (*Phacelia monoensis*)
Mono phacelia is a Sensitive species for both Forest Service Regions 4 and 5, and occurs on the Bridgeport RD of the HTNF. This plant has been listed as a Special Status Species by the Bureau of Land Management for both Nevada and California and is ranked as List 1B by CNPS. Currently there are 12 known occurrences in California where it is known from Inyo and Mono Counties (CNDDB 2016). Within the California portion of the Bridgeport RD this species is known to occur in the lower, northeastern area of Masonic Mountain (USFS 2016). A Conservation Strategy was developed for this species in 2001, in order to outline management direction to ensure the long term survival of this species (Halse 2001).

Mono phacelia is a small, annual, adaphic specialist occurring on alkaline, barren or sparsely vegetated grayish, brownish, or reddish shrink-swell clays of mostly andesitic origin. It occurs on various slopes and aspects, on mostly stabilized natural drainages or artificial disturbances such as road banks. Associated habitat is found within the pinyon-juniper and mountain sagebrush zones from 5,000 to 9,000 feet in elevation.

Threats to Mono phacelia include road grading or maintenance activities which would decrease occupied habitat by the removal of plant material in these areas. Mining activities, such as

exploration, also have impacts to Mono phacelia occurrences. Livestock grazing is known to occur throughout Mono phacelia occupied habitat in some areas. Considering the lack of forage associated with the areas where Mono phacelia grows, grazing related impacts would likely be associated with trampling damage from animals trailing through rare plant habitats. Non-native species, mainly cheatgrass, are documented in many sites which can overgrow and outcompete Mono phacelia for necessary resources.

Whitebark pine (*Pinus albicaulis*)
Whitebark pine is an alpine tree with pale, thin bark. Individuals may have more than one trunk and may be prostrate and shrubby where exposed to the elements (krumholtz form). The trees grow in generally open situations in high conifer forests up to timberline, at elevations of more than 6,500 feet (Baldwin *et al.* 2012), even higher—above 10,000 feet—in the Sierra. The species is distributed through the Rocky Mountains from British Columbia and Alberta to northern Wyoming and further west from the Coast Ranges of British Columbia south through the Cascades to the Sierra Nevada, and there are isolated populations in Oregon, Nevada, and the Klamath Ranges and Warner Mountains of California. The great majority of occurrences are on federal land. Although the species is rapidly declining throughout much of its range due to the combination of white pine blister rust, mountain pine beetle, fire suppression efforts, catastrophic fire, and changing climate, it has so far neither been given a California Rare Plant Rank, nor has it been inventoried by the California Natural Diversity Database (CNDDB 2016). At the federal level, it is on the Candidate species list of the USDI FWS, who currently consider its listing as warranted but precluded by higher priority actions.

In California, *Pinus albicaulis* occurs on both the Bridgeport and Carson Ranger Districts of the HTNF, and is known from eleven other National Forests: the Eldorado, Inyo, Klamath, Lassen, Modoc, Sequoia, Shasta-Trinity, Sierra, Stanislaus and Tahoe National Forests, as well as the Lake Tahoe Basin Management Unit.

Marsh's bluegrass (*Poa abbreviata* var. *marshii)*
In California this species is known from a single occurrence in the White Mountains within Mono County (CNDDB 2016). It is on the Sensitive species list in Regions 4 and 5 of the Forest Service and is ranked as List 2B by CNPS. This species is known from the Ely RD of the HTNF and there is suitable habitat for this species on the Bridgeport and Carson Ranger Districts but no occurrences have been found at present.

Marsh's bluegrass occurs in alpine habitat above 9,000 ft within open areas composed of rock scree, talus, fellfields or loose quartzite. Due to the difficulty in accessing the remote locations in which this species is found, exhaustive surveys have not been conducted; therefore, trends and threats to Marsh's bluegrass are unclear at present.

White Mountain skypilot (*Polemonium chartaceum*)
This species is known from 12 occurrences in California, all of which are located within Mono County (CNDDB 2016). White Mountain skypilot is on the Sensitive species list in USFS Regions 4 and 5, is a ranked as List 1B by CNPS and is on the Nevada Heritage watch list. This taxon is known to occur on the Bridgeport RD of the HTNF in the Sweetwater Range.

White Mountain skypilot occurs in alpine boulder and rock fields, and subalpine coniferous forest on rocky, serpentine, granitic, or volcanic soils at elevations ranging from 5,900 to 13,700 ft. This species is potentially threatened by OHV travel, mining exploration and operations, and the effects of climate change (CNDDB 2016).

William's combleaf (*Polyctenium williamsiae*)
William's combleaf is listed as Sensitive for USFS Regions 4 and 5, and for BLM in California and Nevada. In addition, it is ranked as List 1B by CNPS and as critically endangered by the State of Nevada. Currently this species is known from six occurrences within Lassen and Mono Counties in California, three of which are on lands managed by BLM (CNDDB 2016); within Nevada this species is known from 28 occurrences (NNHP 2016). Two occurrences of this species have been documented on the Bridgeport RD in the vicinity of Sweetwater Summit; however, these occurrences have not been recorded from the area since 2005 and it is believed they have been extirpated due to OHV activity (USDA 2016).

This species occurs on relatively barren sandy volcanic lake margins in Great Basin scrub, vernal pools, playas, marshes and swamps, and pinyon juniper woodland at elevations ranging from 5,670 to 8,930 ft. It is sometimes found along lake-inlet streams.

The habitat for William's combleaf is very susceptible to impacts from grazing animals, alteration for water development or drainage and, damage from OHV use or camping (Holland and Morefield 2002). Williams combleaf does not appear to tolerate soil disturbance (Holland and Morefield 2002).

Mono ragwort (*Senecio pattersonensis*)
Mono ragwort is on the Sensitive species list for both USFS Regions 4 and 5, is ranked List 1B by CNPS and in Nevada is considered At-Risk by the Nevada Heritage Program. There are 11 known occurrences of this species in California, all of which are located within Mono County (CNDDB 2016). On the Bridgeport RD, there are nine known occurrences located in the Sweetwater Mountains and one occurrence on Mount Emma.

This taxon occurs in alpine fell-field areas, on talus slopes and gravelly ridges at and above timberline at elevations ranging from 9,500 to 12,200 ft. The main threat to Mono ragwort is OHV use.

Masonic Mountain Jewelflower *(Streptanthus oliganthus)*
The Masonic Mountain jewelflower has been designated a Sensitive species in both USFS Regions 4 and 5, is ranked List 1B by CNPS and is on the Nevada Heritage Program At-Risk list. This species is known from 18 occurrences within California, 11 of which are located in the Bridgeport RD of the HTNF primarily in the vicinity of Masonic Mountain but also in the Sweetwater Mountains, Bodie Hills and vicinity of Sonora Pass.

This species occurs at elevations ranging from 6,400 to 10,000 ft in pinyon-juniper and sagebrush-grass plant communities, and in Jeffrey pine zones. It grows on rocky slopes and talus, in ravines and in canyon bottoms with sandy or gravelly soil derived from decayed granite or decomposed volcanic rock. It is sometimes associated with large outcroppings.

Across its range, potential threats to the Masonic Mountain jewelflower across its distribution include hydrologic alteration of habitat, livestock grazing and trampling, off-highway vehicles, road development and maintenance, mining operations and loss of habitat to noxious weeds.

VII. Environmental Effects of Alternative 1 - No Action
Within California, much of the Humboldt-Toiyabe National Forest is relatively free of invasive species and is dominated by native vegetation. However, there are numerous noxious weed infestations scattered along roadways and streams, within meadows and at disturbed sites across

the forest. Currently the forest has approximately 1,172 acres of high priority noxious weed infestations targeted for treatment within California, but the actual number of acres infested within the project area is known to be much larger.

Under the No Action Alternative, control and/or eradication of noxious weeds would not occur on HTNF lands within California. However, prevention measures, inventory and monitoring would continue. While prevention measures would help slow the spread of invasive plants, prevention alone is insufficient to address the spread of existing infestations. Invasive plant treatments associated with existing NEPA decisions (Table 2) would continue to occur but new or additional efforts would not be implemented. The lack of effective control measures for treating priority infestations would likely result in the continued spread of invasive species across the forest. Hoary cress and Canada thistle infestations would continue to threaten un-infested areas as it would be difficult to restrict seeds and root fragments from establishing new infestations along riparian corridors. Infestations of Musk thistle and medusahead would continue to grow and act as seed sources for the invasion into currently un-infested areas. Many of these species are high priorities for treatment and eradication by various groups in California (Cal-IPC and CDFA) and are expected to persist and likely spread onto adjacent un-infested lands. Not treating these priority infestations would inhibit the forests ability to prevent further spread, especially of small isolated leading edge infestations of weeds such as Scotch thistle and yellow starthistle.

A. Direct and Indirect Effects of the No Action Alternative

Under Alternative 1, there would be no direct effects to Sensitive plants, other than those associated with ongoing activities. Indirect effects of Alternative 1 would be those associated with the continued persistence and spread of high priority invasive plant species. In the absence of an active weed treatment program, high priority invasive plant populations within the CAIWMP area would continue to spread along roadsides, streams and into other native plant communities. The potential degradation of natural habitat could have wide ranging effects on Sensitive plant populations. As small, isolated invasive plant occurrences potentially expand into large weed infestations, a persistent seed source would become established for weeds to easily colonize new areas. Over time, this cycle from colonization to expansion to the formation of persistent seed source may repeat itself, continue to displace native vegetation and eventually encroach upon Sensitive plant occurrences. Ultimately, Sensitive plant populations may become extirpated from some areas as invasive plants become established and outcompete rare plants for resources such as water, nutrients and sunlight. The Dog Valley ivesia population which co-occurs with bull and musk thistles would continue to be negatively affected by these weeds as its habitat is encroached upon and degraded further. In addition, potential habitat that may support currently unknown occurrences of moonworts, which has already been colonized by Canada thistle or other riparian weeds, could be negatively affected if particular native plants are displaced and important mycorrhizal associations are disrupted.

B. Cumulative Effects of the No Action Alternative

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Since existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects and is consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)).

The implementation Alternative 1 would not result in direct effects to any of the Region 4 Sensitive plant species analyzed within this document. Past, ongoing, and foreseeable future actions would therefore add cumulatively only to the indirect effects of Alternative 1 as described above. The HTNF's first priority for managing invasive species is through prevention. While prevention would continue to serve as the forests' first line of defense for managing invasive species, these measures cannot completely eliminate the risk of future introductions. Under the No Action Alternative, the forest would continue to manage forest lands through a variety of means (timber harvest, ecological restoration, fuel reduction, road construction, etc). Many of these actions pose some risk of introducing or spreading invasive species even after all feasible prevention measures are implemented. The forest would continue to manage through prevention, inventory and monitoring but would have limited ability to respond if new invasive plants infestations result from ongoing or future activities on the forest. The implementation of Alternative 1 is not, however, expected to affect the viability of Region 4 Sensitive plant species within the CAIWMP area or across the HTNF for at least the next 20 years.

VIII. Environmental Effects of Alternative 2 - Proposed Action

This section will discuss the environmental effects of manual, mechanical and prescribed fire treatments, the use of biological controls, and the application of herbicides on priority invasive plants that are currently identified within the CAIWMP area, and the effects of invasive plant treatments that may be proposed in future years as additional infestations are identified for treatment. There is some risk for adverse effects from invasive plant management within and adjacent to Sensitive plant occurrences. Although these potential impacts are of concern, the continued spread of invasive plants also threaten native plant communities and Sensitive plant occurrences; necessitating careful efforts to eliminate invasive plants while also preventing impacts to non-target vegetation. This project proposes to use a variety of control methods under an integrated pest management (IPM) program including 1) manual methods 2) mechanical methods 3) biological controls 4) prescribed burning and 5) herbicide application. Further discussion of risks to sensitive plants are provided below.

A. Direct and Indirect Effects

Direct effects occur when Sensitive plants or their potential habitat are physically impacted by activities associated with the Proposed Action. Direct impacts may include: herbicide direct spray and non-target drift, physically breaking, crushing, or uprooting Sensitive plants, covering them with wood chips or slash, burning during prescribed fire treatments, and compromising suitable Sensitive plant habitat. When plants are damaged, those individuals may experience altered growth and development or reduced or eliminated seed-set and reproduction. If the disturbance is severe, mortality of individuals or populations can occur. These impacts to individual plants can negatively affect growth and development, population size, and species' viability across a landscape. For annual plant species, the timing of impacts is critical. Management actions that are implemented subsequent to seed-set have less affect than management actions conducted prior to seed-set, as the propagules may still have an opportunity to germinate in the future.

Indirect effects are separated from an action in either time or space. These effects, which can be beneficial or detrimental to rare species, may include changes in plant community composition once invasive plant species are removed, impacts to pollinators associated with Sensitive plant species, the residual effects of prescribed fire treatments and biological controls, changes to the

hydrology within Sensitive plant communities, or the indirect effects of herbicide application, including off-target drift and surface runoff affecting Sensitive plant habitat.

Direct and Indirect Effects of Manual, Mechanical and Prescribed Burning Treatments
The direct effects of manual (hand pulling, clipping, digging, mulching, tarping), mechanical (mowing, cutting, brushing, trimming, weed eating) and prescribed burning treatments would be restricted to the area of treatment and area immediately surrounding the infestation that may experience foot or equipment traffic during implementation. Invasive plant treatments may alter plant community composition by decreasing invasive plant cover and increasing the habitat available to other plant species; potentially creating new areas for rare plants to colonize when in close proximity to treatment sites.

Hand pulling and mechanical removal: When invasive plant infestations are controlled near or within Sensitive plant occurrences the forest would always first consider selective, non-chemical methods to control the infestation. While hand pulling and other mechanical methods for removing invasive species can be effective and highly selective, there are some risks of impacts to Sensitive plants from these control methods. When working in Sensitive plant area it is possible that crew members may trample, uproot, or otherwise disturb Sensitive plant habitat. It is also possible that invasive plant material could be left onsite and impact habitat quality for Sensitive plant species.

String trimmer/mowing: Similar to hand pulling and other mechanical control methods, using a string trimmer or mowing within Sensitive plant occurrences could impact the occurrences by trampling, cutting, uprooting or otherwise disturbing a Sensitive plant.

Clipping and cutting: Clipping and cutting invasive species within Sensitive plant populations has a relatively low risk for adverse effects. Like other non-chemical control measures the primary risk is the potential trampling, crushing, or otherwise disturbing Sensitive plant populations when treating invasive plant infestations. For larger infestations it is possible that cut materials would impact habitat quality if left on site.

Tarping and mulching: Tarping and mulching invasive species near Sensitive plant populations could be effective if the tarp or mulch does not adversely affect the continued viability of the Sensitive species. Potential risks of these methods include inadvertently covering Sensitive plants with a tarp or mulch material or potentially trampling Sensitive plants when placing the mulch or tarps.

Prescribed burning: Prescribed burning within or adjacent to Sensitive plant occurrences poses a relatively low risk for adverse effects. This treatment would most likely be used to control invasive, annual grass infestations such as medusahead and cheatgrass which tend to result in low intensity burns. However, there is potential for the above ground parts of Sensitive plants to be consumed by fire during prescribed burning operations and there are risks associated with the construction of containment lines.

Within the CAIWMP area there is one occurrence of Dog Valley ivesia which co-occurs with bull thistle and musk thistle, and there are known noxious weeds within habitat suitable for rare moonwort species; no other known occurrences of HTNF Sensitive plants are within 500 of any known invasive plant infestations. The Dog Valley ivesia plants within this occurrence would be identified and flagged to minimize direct impacts to individuals, as stipulated by project Design Features. Although hand pulling is not excluded from Sensitive plant occurrences, the direct

effects of this action on Dog Valley ivesia would be minimal due to the low potential for ground disturbance from this action. This occurrence of Dog Valley ivesia may benefit from the indirect effects of invasive plant treatments with the reduction in weeds that are currently competing for water, nutrients and sunlight. The removal of concentrations of bull and musk thistles may also open up new microsites for Dog Valley ivesia to colonize.

Botanical surveys would be conducted prior to invasive plant treatments within suitable habitat for *Botrychium* spp.; new occurrences discovered as a result of these surveys would be flagged and avoided to minimize direct impacts to these species. The removal of invasive plant species from potential moonwort habitat could preserve or enhance characteristics of the native plant community within these sites, and in turn benefit moonworts, which rely upon mycorrhizal associations with neighboring plants. In addition, the area within 25 feet of future proposed manual, mechanical and prescribed burning treatments would be surveyed for HTNF Sensitive plant species to ensure these same protective measures would be applied if HTNF Sensitive species are located within or adjacent to new invasive plant treatment areas.

Project Design Features also stipulate that fire lines and staging areas for prescribed burning treatments would not be constructed within HTNF Sensitive plant occurrences; yet there is some risk that Sensitive plants may be impacted by prescribed fire in areas densely infested with invasive annual grasses such as cheatgrass and medusahead. While the above ground parts of HTNF Sensitive and native plants may be damaged, the below ground portions of perennial species may survive given the lack of residual heat associated with these types of prescriptions, enabling them to re-sprout when conditions are favorable, and low intensity fire would not be expected to negatively affect the existing seed bank, allowing for both annual and perennial species to recover. A low intensity controlled burn may temporarily eliminate invasive plants and their current year's seed production, which should benefit HTNF Sensitive plant species and native plant communities. However, experience has shown that using prescribed fire exclusively to eliminate noxious weeds often requires multiple treatments across successive years to effectively deplete their storage reserves and/or reduce seed sources. Artificially altering fire regimes within these sites could impact rare and native plants if their ability to re-sprout is impaired or seed sources are critically depleted, potentially creating areas with bare mineral soil for other opportunistic weeds to colonize. Prescribed fire alone may not be an effective method of treatment; however, if the results of post treatment monitoring indicates an undesirable response to this form of weed management an alternative treatment or combination of treatments described in the Proposed Action would be considered.

As part of the forest annual implementation planning process, the Forest or District Botanist would ensure that all HTNF Sensitive and Watch List plant occurrences are properly identified on the ground, and necessary site specific Design Features are in place prior to initiating treatments of new infestations. Therefore, with the incorporation of an annual implementation planning process and project Design Features, the risk of direct and indirect effects to HTNF Sensitive plant species from manual, mechanical and prescribed burning treatments would be minimal.

Direct and Indirect Effects of Biological Control Treatments

The release of insects and pathogens to manage noxious weeds within the CAIWMP poses a slight risk to Sensitive plants. These agents target undesirable species; however, Sensitive plant tissue could be consumed or used for larval development by biocontrol insects, or negatively

affected by pathogens which may reduce the viability of a portion of the plants within a population. These effects are expected to be minor, given that the insects and pathogens used for these treatments are selective, most effects would be attributed to spillover from the invasive plant to the Sensitive plant, a situation not expected to impact large numbers of Sensitive plants within a specific occurrence. Within the CAIWMP area there is one occurrence of Dog Valley ivesia which co-occurs with bull thistle and musk thistle, and there are known noxious weeds within habitat suitable for rare moonwort species; no other known occurrences of HTNF Sensitive plants are within 500 of any known invasive plant infestations. Some plants within the Dog Valley occurrence and non-target species within moonwort habitat may be affected by the use of insects or pathogens. However, a reduction in the number of individual weeds is expected to reduce competition for resources, increase native plant community diversity and in turn benefit Sensitive plant species over the long-term.

Use of domestic livestock to manage undesirable vegetation could adversely affect native plant communities and Sensitive plant species. Sheep and goats are commonly used to control weed populations, the contractors who specialize in this service have trained their animals to feed on target weed species; nonetheless, there may be impacts to Sensitive plant species which occur in the treatment area from consumption, trampling, soil churning or defecation. However, for the purposes of weed control, the operator often uses a portable fencing system to help 'target' the animals on focal species. In other areas the operator may direct grazing animals to quickly sweep through the treatment area, rather than congregate in one place for an extended period, which could limit potential impacts from trampling, defecation and soil churning. Negative effects to moonwort habitat could occur if moist, riparian soils are churned to the extent that the underground portions of the individual moonworts and/or mycorrhizal assemblages are damaged. However, the use of grazing animals for weed control in riparian areas is not likely to occur; these areas would primarily be treated by manual or mechanical methods, with biocontrol insects, or with the use of herbicides. There is potential for other Sensitive plants to be impacted that are located within newly established weed infestations selected for this method of treatment. The severity of potential impacts would depend on the particular Sensitive species and its proximity to the weed infestation; but these impacts would be short-term and not likely to affect the viability of the Sensitive plant population as a whole. When managed properly, it has been demonstrated that the use of sheep and goats to manage certain species of invasive plants through targeted grazing has improved the conditions of native plant communities by creating spaces within previously infested sites for native grass and forb growth.

Overall, potential impacts to HTNF Sensitive plants from the use of biological control treatments of invasive plant species are expected to be short-term and minimal.

Direct and Indirect Effects of Herbicide Treatments

Herbicides can kill or injure plants through direct contact or through alteration in their normal growth. Selective herbicides may target different plant groups, such as monocots or dicots, or specific plant families. However, some invasive plant species, such as tall whitetop and Canada thistle, are difficult to control even with the use of herbicides and may require multiple chemical treatments to effectively contain an established infestation. The potential to harm non-target species is dependent on herbicide characteristics. Herbicides vary in their method of action, potency, selectivity, and persistence. The closer the non-target stem is to the treatment site, the greater is the likelihood of damage to susceptible plants. In addition, selective herbicides are more likely to affect species within the same family; whereas non-selective herbicides have the

potential to affect all plants. Within the CAIWMP area there is one occurrence of Dog Valley ivesia which co-occurs with bull thistle and musk thistle, and there are known noxious weeds within habitat suitable for rare moonwort species; no other known occurrences of HTNF Sensitive plants are within 500 of any known invasive plant infestations.

The ecological effects of ***Aminopyralid, Chlorsulfuron, Glyphosate, Imazapyr, Sulfometuron-methyl*** and ***Triclopyr*** are discussed in detail in Human Health and Ecological Risk Assessments produced by Syracuse Environmental Research Associates (SERA) for each herbicide (SERA 2007, SERA 2004a, SERA 2011a, SERA 2011b, SERA 2004b, SERA 2011c). While the ecological effects of ***Rimsulfuron*** are discussed in the Rimsulfuron Ecological Risk Assessment (ERA) Final report produced by the BLM (USDI BLM 2014). These Risk Assessments take into account application rates and methods to quantify potential risks to non-target plant species from direct spray, off-target drift, and off-site movement of these herbicides.

The ecological effects of herbicide additives such as surfactants and dyes are also discussed in the SERA Risk Assessments. Surfactants such as Hasten® and Competitor® are modified vegetable oils, which would be very unlikely to produce secondary breakdown products that would act as toxins to rare plant species. In addition, marker dyes such as Hi-light® Blue are water-soluble, contain no listed hazardous substances (SERA 1997, USDA FS 2007), and would be unlikely to cause adverse effects on rare plant species.

Although species-specific information regarding the direct effects of the seven proposed herbicides on Region 4 Sensitive plant species is unknown, risk assessment hazard quotients that quantify the potential risks to non-target plant species from the proposed action will be used to discuss project effects to HTNF Sensitive plant species with known occurrences or potential habitat within the CAIWMP area.

Potential effects to HTNF Sensitive plant species from invasive plant treatment involving herbicide include 1) direct exposure (accidental direct spraying or over-spraying) 2) off-target drift 3) movement of chemicals on soil and 4) accidental spills. Risk of affects from the above exposure scenarios will depend on whether the Sensitive plant is susceptible or tolerant to the proposed herbicide. Treatments using herbicides can also impact pollinators associated with Sensitive plant species.

Direct exposure: Effects from direct exposure are dependent on a combination of factors including the Sensitive plant species, the timing and method of application, and the herbicide applied to the Sensitive plant species. While the forest has a general understanding of which Sensitive plants may be affected by proposed herbicides, available information cannot prove that a given herbicide would not adversely affect a species. As a conservative approach this analysis assumes that HTNF Sensitive species are as susceptible to the effects of the proposed herbicide as the most sensitive plant listed within the corresponding risk assessment. Unfortunately risk assessments for direct exposure are based on vascular plant species which may serve as a poor surrogate for nonvascular Sensitive species. In general lichens and bryophytes are considered highly sensitive to various forms of pollution and environmental contaminants because of their inability to regulate uptake of material. In addition bryophytes utilize many of the same growth regulators as vascular plants and could be susceptible to herbicide exposure (Newmaster, 1999). Therefore, it is possible that HTNF Sensitive bryophytes and lichen species are more susceptible to low concentrations of herbicides than the most susceptible vascular plant used in the SERA and BLM risk assessments. In the absence of available information on bryophyte and lichen

sensitivity, herbicide application within 500 feet would not occur unless treatments are overseen by a Forest Service Botanist.

The risk of direct exposure would also be dependent on the selectivity of the application method. Spot spray and broadcast spray have the greatest risk for direct exposure to non-target vegetation if used in the vicinity of Sensitive plant species. However, with the incorporation of project Design Features, broadcast spray would not be allowed within 500 feet and spot spray within 100 feet of HTNF Sensitive plant species; therefore, any effects from direct spray on Dog Valley ivesia or any new HTNF Sensitive species occurrences discovered near weeds targeted for herbicide treatment are not expected. In addition, known HTNF Sensitive bryophyte occurrences would be protected from direct exposure by Design Features restricting the use of herbicides within 500 feet of these occurrences, unless a FS Botanist has established specific treatment guidelines within these areas.

To limit the potential for direct exposure from herbicide use on native plants which may provide habitat for moonworts and other HTNF Sensitive plant species occurring within riparian corridors and wet meadows, Design Features stipulate that herbicide application would be limited to direct foliar spray or wiping methods and spray would be directed away from native vegetation in these areas. Wicking and wiping would be the preferred method of herbicide application within moist habitats or near HTNF Sensitive plant occurrences and are expected to have the least potential for direct exposure to non-target vegetation, since application is wiped onto the target vegetation (no over-spray). Yet there is a low probability for drips to affect non-target vegetation with wicking and wiping application methods. It is possible that some native plants that have formed mycorrhizal associations with moonworts or provide habitat for other Sensitive plant species may be negatively affected by the use of herbicides to control neighboring weeds, which in turn could impact some individuals of a rare plant population. However, these effects are not likely to impact large numbers of native plants within these habitats or many, if any, moonworts or other HTNF Sensitive plants within the general area of weed infestation. In addition, the treatment of noxious weeds within these habitats is expected to have beneficial effects to moonwort and other HTNF Sensitive plant occurrences that may be present within or near the area of infestation.

Off-target drift: Drift is the movement of any herbicide through the air to areas not intended for treatment. Drift includes volatilization, where some herbicides may be rapidly lost as vapors after application. Drift depends on droplet size, wind speed and direction, height above ground of the application, herbicide formulations and ambient temperature. Distances where drift from spray herbicide applications of Aminopyralid, Chlorsulfuron, Glyphosate, Imazapyr, Sulfometuron-methyl and Triclopyr acid may effect Sensitive plant species were set by identifying the modeled distance where the hazard quotient from drift approached a value of one, based on the average application rate used in Forest Service programs and/or the rates used in the SERA Risk Assessments (Table 5). In other words, the downwind distance from the herbicide spray application where the modeled concentration from drift may be similar to the lowest concentration of an observable effect on the surrogate plant species most sensitive to the proposed herbicide.

Table 5. Distances from Sensitive[2] Plants where Hazard Quotients (HQ)[1] from spray drift approach a value of 1.

Herbicide	Distance from Plants (ft)	Sensitive[2] plant HQ	Tolerant plant hazard HQ
Aminopyralid (0.11 lb/ac)	500	1.1	<0
Chlorsulfuron (0.056 lb/ac)	900	7	<0
Glyphosate (2 lb/ac)	900	1.7	<0
Imazapyr (1 lb/ac)	900	17	<0
Sulfometuron-methyl (0.045 lb/ac)	900	2	<0
Triclopyr acid (1 lb/ac)	500	0.7	<0

[1]HQ less than or equal to 1 indicate that no effects are anticipated to individual plants.
[2]Defined as the species with the greatest sensitivity to low amounts of herbicide, not a Forest Service Sensitive plant.

The drift coefficients used for this analysis are based on a boom application using a fine-coarse droplet spray at 20 inches above the target vegetation with 10 mph wind speeds. This method of treatment would be used in rare instances to control large infestations generally occurring along roads and would include additional measures to reduce drift, such as low pressure spray nozzles and a wind speed limit of eight mph. The majority of herbicide treatments would occur by spot spray with backpack sprayers or by hand with wiping or dip and clip techniques. It is worth noting that the scenario used to quantify the above hazard quotients exceeds a number of restrictions included in the proposed project to limit drift, so the actual drift expected from backpack applications are expected to be lower than the modeled hazards in the herbicide risk analysis (SERA 2009). While the SERA worksheets indicate that extremely low amounts of Chlorsulfuron, Glyphosate, Imazapyr and Sulfometuron-methyl may affect intolerant species at a distance greater than 500 feet, these HQs only apply to broadcast applications using a boom which project Design Features prohibit within 500 feet of HTNF Sensitive plant occurrences. In addition, according to the SERA risk assessments for Chlorsulfuron, Glyphosate, Imazapyr and Sulfometuron-methyl, offsite drift from backpack applications should be reduced substantially compared to broadcast applications from a boom (the modeled scenario used in these risk assessments), but the extent of this reduction has only been quantified for Imazapyr, which exhibited an approximate decrease of 30% in HQ value (SERA 2011b).

Under the BLM ERA for Rimsulfuron, risks were evaluated from off-site drift at modeled distances of 25, 100 and 900 feet from the application site for low boom applications (20 inches above ground). The AgDRIFT® computer model was used to estimate off-site herbicide transport due to spray drift, where Risk Quotients (RQ) quantify the potential risks to non-target plant species; RQ values greater than 1 indicate the potential for impacts to these plants. The following table (Table 6) presents RQ values for non-target terrestrial plants at the typical application rates used by BLM with a low boom. The results of this modeling scenario indicate low risks to non-target plant species at distances of 100 feet or greater from the application site.

Table 6. Risk Quotients (RQ)[1] from spray drift of Rimsulfuron on Non-Target Plant Species.

Application Rate (lbs/acre)	Distance from Plants (ft)	Sensitive[2] plant RQ
0.0469	25	1.67
0.0469	100	0.833
0.0469	900	0.238

[1]RQ less than or equal to 1 indicate that no effects are anticipated to individual plants.
[2]Defined as the species with the greatest sensitivity to low amounts of herbicide, not a Forest Service Sensitive plant.

The majority of the proposed invasive plant herbicide treatments are not near existing HTNF Sensitive plant occurrences (within 500 feet). In addition, with the incorporation of Design Features to limit drift (wind restrictions and low nozzle height) and the targeted use of herbicide (direct foliar spray and wiping methods in sensitive habitat) the effects from drift would be minimized. There is potential for drift to effect the Dog Valley ivesia population that co-occurs with bull and musk thistles, potential moonwort habitat and other HTNF Sensitive plant occurrences that may be located near weed infestations targeted for treatment in the future; however, these effects would also be reduced by proper application of the herbicide using the label information and by adherence to the Design Features in the EA. For example, where the application of herbicides is proposed in locations within 100 feet of HTNF Sensitive plant species, the use of wicks or dip & clip would apply herbicide directly to weed surfaces; effectively eliminating drift near habitat known to be occupied by HTNF Sensitive plant species. Overall, there is little risk of death or damage to HTNF Sensitive plant species from spray drift.

Movement of chemicals on soil:

Surface runoff - is water moving over the surface of a field or treated area that can carry herbicide with it. The greatest loss of herbicide occurs when the herbicide is applied to the soil surface and is washed off by the first rain after application. Applying herbicide to the soil surface is not one of the treatment methods proposed in this project. Effects to Dog Valley ivesia, moonwort habitat and potential HTNF Sensitive plant occurrences near future weed treatment areas from runoff, such as uptake by roots, and translocation to plant organs that injure or kill the plant, would be controlled and minimized by using the application methods presented in the Proposed Action, and by adherence to the Design Features.

Leaching – occurs when water carries herbicides into and ultimately out of the root zone. The portion lost to leaching depends on soil texture, herbicide solubility, and amount and intensity of rainfall. Impacts from leaching to Dog Valley ivesia, moonwort habitat and other HTNF Sensitive plants, such as uptake by roots and translocation to plant organs where it may injure or kill the plant, would be minimized since applications of herbicide would adhere to the relevant Design Features in the EA, such as those addressing favorable weather conditions listed above.

Accidental spills: When working with herbicides there is a remote risk of accidental spills or other exposure scenarios other than those described above. To limit the potential for herbicide spills impacting HTNF Sensitive plant occurrences, mixing and loading of herbicides would occur only on level, disturbed sites off of roadways, such as the interior of landings, and water drafting from aquatic features would not occur. An additional exposure scenario that could affect Sensitive plant populations is accidental equipment malfunction when treating invasive plant infestations near Sensitive plants. Project Design Features requiring regular inspection and tests of all equipment used for herbicide application would greatly reduce the risk of herbicides spills

when working near Sensitive plant populations. In addition, a small spill containment kit would be carried by herbicide applicators when wicking and wiping to further limit potential effects in the event of equipment failure.

Pollinators:

Habitat changes resulting from the invasion of noxious weeds are known to disrupt relationships between insect composition and native plants (USDA 2005). In addition, the use of herbicides has the potential to shift species composition and reduce the diversity of native plant communities, as less herbicide-tolerant species are replaced by more herbicide-tolerant species. Some damage to non-target plant species from herbicide application is probable despite cautious planning and implementation. The properties of certain herbicides and the methods by which they are applied could also harm plant pollinators. Pollinators can be directly affected by spray or indirectly when plants needed as food for adults or larvae are eliminated by herbicides (USDA 2005). If a reduction or shift in pollinator species occurs, changes to plant species composition or diversity could follow. Plants that are dependent on a particular insect for pollination may experience a decrease in reproductive capabilities if their pollinator is impacted by herbicides. Little information is available on the effect of herbicides on the wide range of native pollinator species found across the project area; however, herbicide risk to the non-native honey bee, a surrogate for pollinators, can be found in the SERA Risk Assessments for the individual herbicides proposed under this project; with the exception of Rimsulfuron. The potential impacts on pollinator species have been analyzed with a direct spray scenario on honey bees, assuming 100 percent absorption of each proposed herbicide. The results of this analysis are summarized in Table 7 which lists the Hazard Quotients of a direct spray scenario for the honey bee as documented in the SERA Risk Assessments for Aminopyralid, Chlorsulfuron, Glyphosate, Imazapyr, Sulfometuron-methyl and Triclopyr (SERA 2007, 2004a, 2011a, 2011b, 2004b, 2011c). The results of this analysis indicate there would be a low risk to honey bees using the chemicals at the application rates and volumes proposed. In addition, Rimsulfuron has low toxicity to honeybees. According to EPA ecotoxicity classifications, Rimsulfuron poses little to no acute toxicity hazard to terrestrial animals including mammals, birds, and honeybees (USDI BLM 2014). The Rimsulfuron mode of action is to inhibit acetolactate synthase, an enzyme that catalyzes the biosynthesis of certain amino acids in plants. As this enzyme only occurs in plants, Rimsulfuron would be expected to have little toxic impact on honey bees and other invertebrates.

Table 7. Herbicide Hazard Quotients (HQ)[1] for honey bees from a direct spray scenario at the typical FS application rate and assuming 100% absorption of herbicide.

Herbicide and Typical Application Rate	Honey Bee HQ
Aminopyralid (0.11 lb/ac)	0.6
Chlorsulfuron (0.056 lb/ac)	0.4
Glyphosate (2 lb/ac)	0.2
Imazapyr (1 lb/ac)	0.6
Sulfometuron-methyl (0.045 lb/ac)	0.007
Triclopyr acid (1 lb/ac)	0.1

[1]*HQ less than 1 is considered to be a low risk to individual honey bees.*

Given the large size of the project area compared to the acreage proposed for treatment, the

accidental spraying of pollinators and any subsequent injuries to these pollinators is expected to be a small percentage of the total available number of pollinators likely to occur within the CAIWMP area. In addition, the Hazard Quotients documented within the SERA Risk Assessments and the EPA analysis of Rimsulfuron suggest there is a low risk of negative effects resulting from the direct spray of the proposed herbicides on pollinators. Therefore, no effect to the overall pollination of HTNF Sensitive plants is expected and the potential impact to native pollinators within the project area is expected to be minor.

Under Early Detection Rapid Response (EDRR), future invasive plant treatments may occur near HTNF Sensitive plant species if a botanist has determined that the treatment is consistent with management direction for a given HTNF Sensitive species, and other control methods are likely to be ineffective. In the event that future control efforts include herbicides near Sensitive plant species, a Forest Service Botanist would work closely with applicators to avoid affects from off-target (drift, runoff, leaching) and direct exposure when working within the area where the risk from drift to HTNF Sensitive species is above the threshold of concern. Possible methods to limit affects from drift could include the use of alternative application methods that do not produce fines with a high potential for drift, such as wicking, wiping, drizzle; timing selective application methods so HTNF Sensitive plants are not likely to be affected by drift; using a spray cone; covering Sensitive plants during herbicide applications, or scheduling spray applications when prevailing winds (< 5 mph) are blowing away from Sensitive plant habitat.

Due to the limited number of invasive plant infestations proposed for herbicide treatment, the physical separation between the majority of known HTNF Sensitive plant occurrences and invasive plant infestations targeted for herbicide treatment, the highly targeted application methods and the incorporation of project Design Features, the potential for direct and indirect effects from herbicide treatments on known HTNF Sensitive plant occurrences, and those that may be discovered in the future, is expected to be minimal. In addition, effective treatment of noxious weeds would reduce the threat and potential impacts of weeds degrading Sensitive plant populations and their habitat; thus, providing beneficial effects over time. This alternative would allow for greater protection of rare plant populations from noxious weed invasions than the No Action Alternative. Future invasive plant infestations or expansions, especially those that are difficult-to-treat, can be removed before becoming large infestations. If they are near HTNF Sensitive plants, they can be controlled in time before seriously threatening the habitat of these rare plants. Once infestations have been allowed to produce seed and/or reproduce vegetatively, they would take more time and effort to eradicate.

Cumulative Effects:

Current inventories of HTNF Sensitive plant species capture the aggregate impact of past human actions and natural events that have led to the current inventory of these species within the project area (CEQ 2005). Past human actions and natural events are therefore implicit within existing conditions and are addressed within the Affected Environment section above. These include the effects of road construction and maintenance, ongoing manual invasive plant treatments, livestock grazing, as well as timber harvest activities on NFS lands within the project area. Past effects may also result from recreation, personal fuelwood cutting and the effects of wildland fires on the native plant community. Ongoing road maintenance, fuelwood cutting, livestock grazing and the implementation of vegetation management projects in Dog Valley, Monitor Pass, Hope Valley and the West Carson Watershed may also add cumulatively to the effects of the CAIWMP to HTNF Sensitive plant species. Foreseeable future actions include

Leviathan-Loope Range, Bordertown to California powerline construction, West Carson Watershed Restoration project and the Sardine Meadows Restoration project.

Cumulative effects for all species analyzed within this document are spatially bounded by the CAIWMP area and temporally bounded by a 20 year period. Cumulative effects would result when the direct and/or indirect effects of Alternative 2 on a given species add incrementally to the effects of past, present, and reasonably foreseeable future actions. Ongoing HTNF project activities would have similar effects to these species as the CAIWMP, since all projects would be surveyed according to the procedures outlined in the Forest Service Handbook (FSH 2609.25.11) during the planning process or prior to project implementation. In addition, future projects would incorporate similar Design Features to flag and avoid known occurrences of HTNF Sensitive plant species unless the project is intended to restore or enhance the species or its habitat, or potential impacts are believed to be minor. Ongoing activities with the greatest potential to impact Sensitive plant species include those associated with road maintenance and livestock grazing.

Road maintenance would add little to no cumulative effects on the vast majority of HTNF Sensitive plant populations, since only six occurrences are known from within 100 feet of any roads within the project area. However, a small portion of the Dog Valley ivesia population which co-occurs with bull and musk thistles is located adjacent to Forest System road 31038. There is a slight risk of additional impacts to this Dog Valley ivesia occurrence from road maintenance equipment used to reinforce road surfaces, maintain culverts and remove vegetation from road shoulders. Yet, any Dog Valley ivesia plants that may occur along the road shoulder would be flagged for avoidance prior to any major road work and the majority of this occurrence is situated within a meadow far from the road; therefore, any potential road maintenance impacts would be minimal. The remaining five HTNF Sensitive plant occurrences located near Forest System roads are not in areas currently targeted for weed treatments. Road maintenance activities near these Sensitive plant occurrences are not expected to add cumulatively to the treatments proposed under the CAIWMP. In addition, if new noxious weeds are found within or adjacent to these occurrences, adherence to EDRR protocol would eliminate new infestations in these areas before they became established, further minimizing potential negative effects to these Sensitive plant occurrences.

There are currently 39 active grazing allotments within the project area. Effects from livestock grazing can include foraging of plants, or impacts to habitat through hoof action and defecation. There are 23 known HTNF Sensitive plant occurrences within allotments with active grazing, many of these species inhabit areas lacking adequate forage for livestock but potential effects from livestock trailing may occur. Currently, there are no known HTNF Sensitive plants within 500 feet of any weed infestations proposed for treatment in these active allotments. However, suitable habitat for moonwort species occurs within some of these allotments where weed infestations are known to occur and are proposed for treatment. In these areas, direct or indirect effects from the CAIWMP on moonwort species and habitat may add incrementally to the potential effects from past and present livestock grazing. Nonetheless, with the incorporation of project Design Features, such as surveying for *Botrychium* species prior to any weed treatments within riparian plant communities and flagging any moonworts found for avoidance, the potential for detrimental impacts from the CAIWMP on rare moonwort species is small and the long-term effects from weed treatment activities proposed under the CAIWMP are expected to be beneficial.

As with ongoing actions, future actions on HTNF lands such as Leviathan-Loope Range, Bordertown to California powerline construction, West Carson Watershed Restoration project and Sardine Meadows Restoration project would be surveyed following the Forest Service Handbook guidelines to ensure that any impacts to Sensitive plant species are either beneficial or mitigated so that the long-term viability of each HTNF Sensitive plant species on the forest is maintained.

Past, ongoing and foreseeable future actions may add cumulatively to the direct and indirect effects of Alternative 2 as described above. The implementation of Alternative 2 may result in direct or indirect effects to Dog Valley ivesia, potential moonwort habitat and other HTNF Sensitive plant occurrences located near future weed treatments, but these effects would be minimal and short-term. In addition, the long-term effects to HTNF Sensitive plant populations resulting from noxious weed treatments would be beneficial. Given that the majority of the known occurrences of HTNF Sensitive plant species are greater than 500 feet from currently proposed treatments, no direct or indirect effects to these species are currently anticipated. There is, however, the potential that surveys around new infestations identified for treatment in subsequent years may detect new HTNF Sensitive plant occurrences in the vicinity of proposed treatment areas. Direct and indirect effects to new occurrences would be comparable to those described for Dog Valley ivesia and moonwort habitat.

Overall, the potential effects from the CAIWMP when added to the past, ongoing and reasonably foreseeable future impacts of HTNF vegetation management treatments, road construction and maintenance, livestock grazing, fuelwood cutting and recreational use would not lead to a loss of viability for Dog Valley ivesia, *Botrychium* species or other HTNF Sensitive plant species within the CAIWMP area or across the Humboldt-Toiyabe NF.

IX. Determination

Of the 25 HTNF Sensitive plant species that are either known from or have potential habitat within the project area, there is only one occurrence of Dog Valley ivesia and potential habitat for moonworts in the vicinity (500 feet) of known invasive plant infestations. Any potential impacts from project activities are expected to be minimal and short-term, since proposed invasive plant treatments have been designed to reduce potential impacts to HTNF Sensitive plant occurrences. The proposed project also allows for the treatment of new infestations when found on the forest. Detrimental effects to HTNF Sensitive plants from future invasive plant treatments are not expected since all future treatments in the vicinity of HTNF Sensitive plants would be developed in compliance with project Design Features already developed to reduce impacts to these species.

Therefore, it is my determination that with the incorporation of project Design Features, the implementation of Alternative 2 of the California Integrated Weed Management Project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for:** Long Valley milkvetch (*Astragalus johannis-howellii*), Lavin's milkvetch (*Astragalus oophorus* var. *lavinii*), Bodie Hills rockcress (*Boechera bodiensis*), Galena Creek rockcress (*Boechera rigidissima* var. *demota),* Tiehm's rockcress (*Boechera tiehmii*), upswept moonwort (*Botrychium ascendens),* dainty moonwort (*Botrychium crenulatum),* slender moonwort (*Botrychium lineare*), moosewort (*Botrychium tunux*), Tioga Pass sedge (*Carex tiogana),* Bodie Hills draba (*Cusickiella quadricostata),* Tahoe draba (*Draba asterophora* var. *asterophora),* Sierra Valley ivesia (*Ivesia aperta* var. *aperta),* Dog Valley ivesia (*Ivesia aperta*

var. *canina),* Plumas ivesia (*Ivesia sericoleuca),* three-ranked hump-moss (*Meesia triquetra*), Shevock's bristle-moss (*Orthotrichum shevockii*), Spjut's bristle-moss (*Orthotrichum spjutii*), Mono phacelia (*Phacelia monoensis),* Whitebark pine (*Pinus albicaulis*), Marsh's bluegrass (*Poa abbreviata* var. *marshii),* White Mountain skypilot (*Polemonium chartaceum*), William's combleaf (*Polyctenium williamsiae),* Mono ragwort (*Senecio pattersonensis)* or Masonic Mountain jewelflower (*Streptanthus oliganthus).* There would be no effect to other Region 4 Sensitive plant species from the implementation of the California Invasive Weed Management Project because they are either not known to occur in California or there is no potential habitat for these species within the project area (Section IV above).

X. Compliance with Forest Plan and other Regulatory Direction

All alternatives for the California Integrated Weed Management Project are consistent with the Forest Plan (USDA FS 1986) and other direction with regard to Region 4 Forest Service Sensitive plant species and their habitats.

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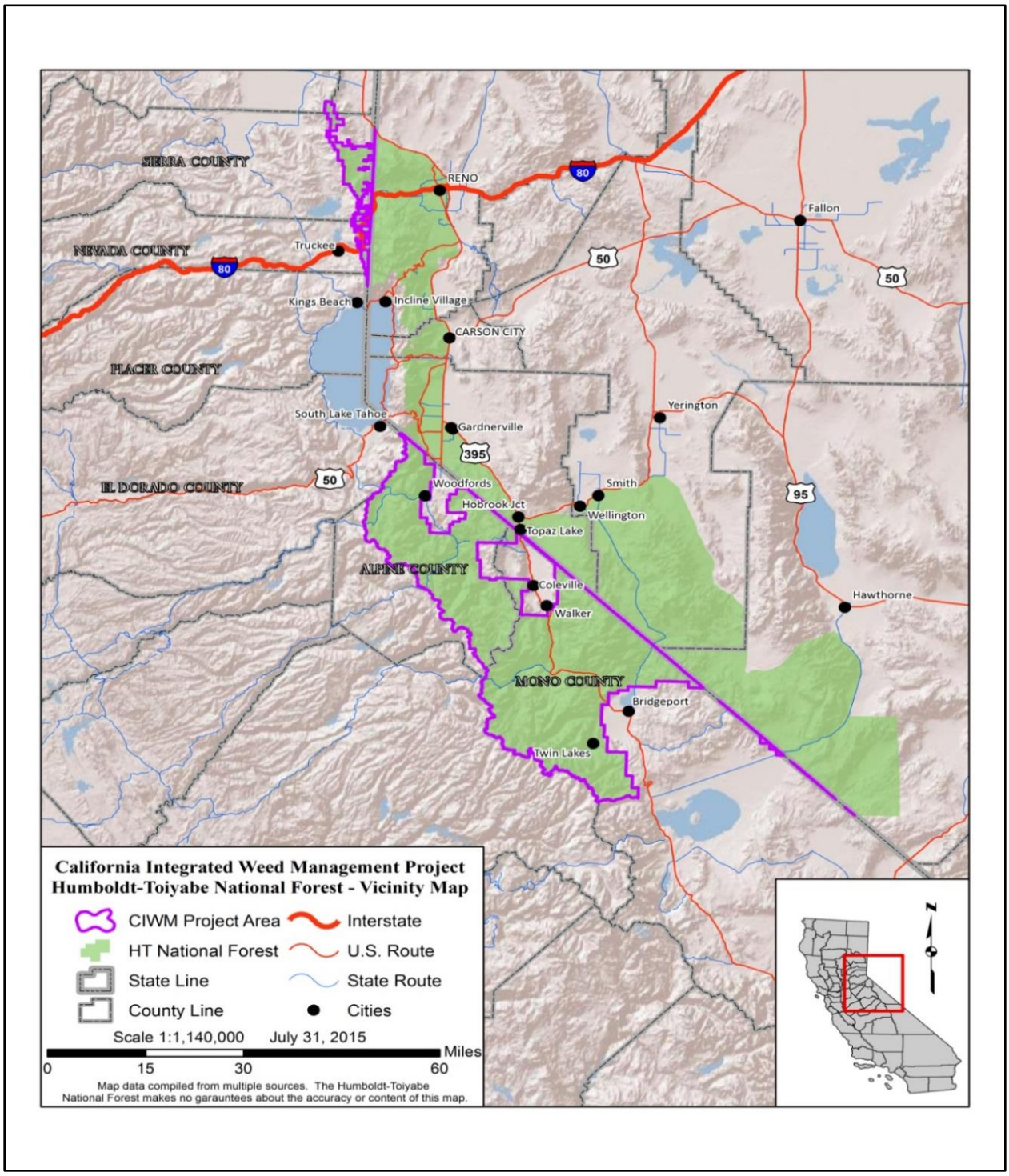
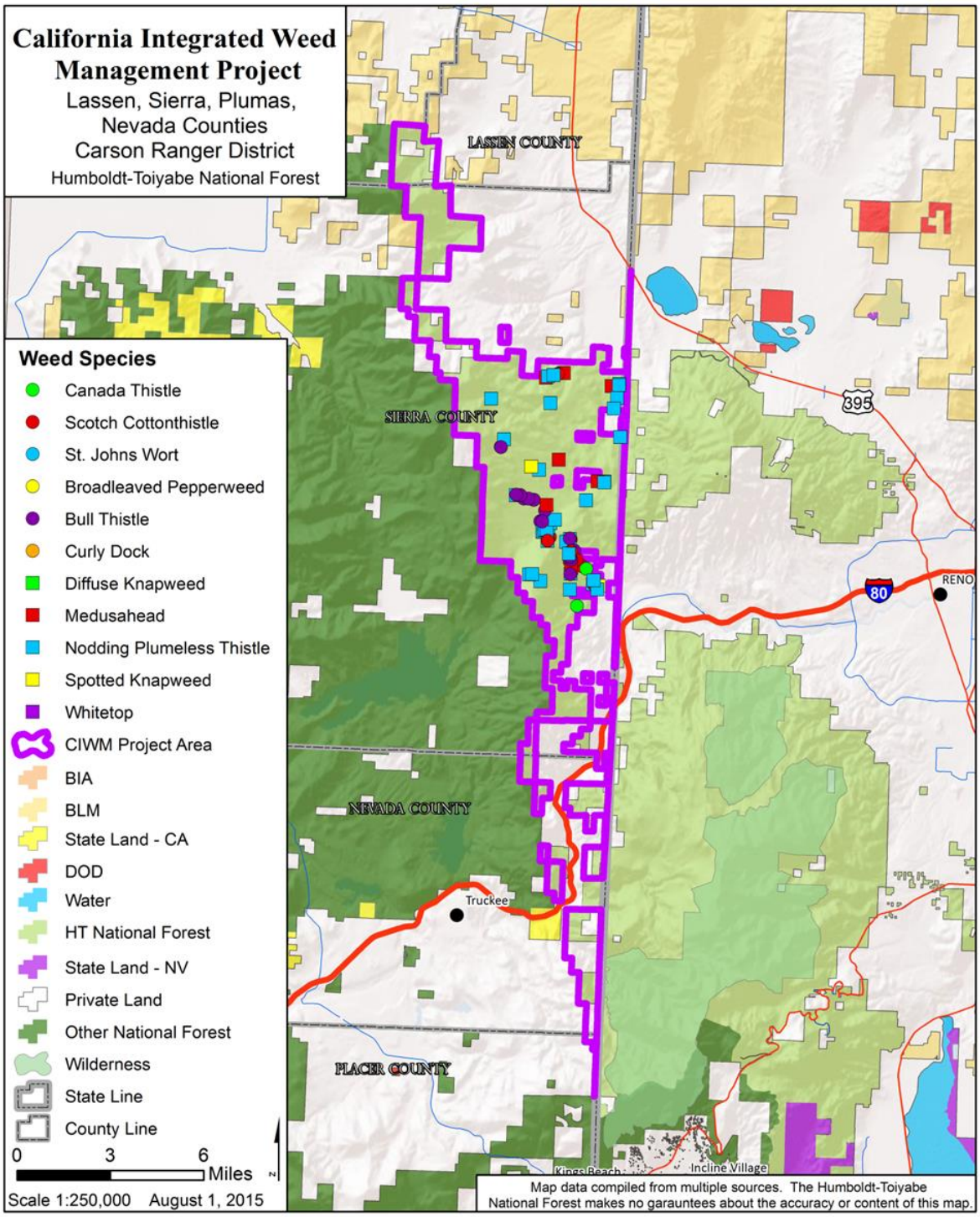
XII. Map Appendix

Map 1: California Integrated Weed Management Project vicinity map.
Map 2: Current invasive weed populations within the northern portion of the project area.
Map 3: Current invasive weed populations within the central portion of the project area.
Map 4: Current invasive weed populations within the southern portion of the project area.

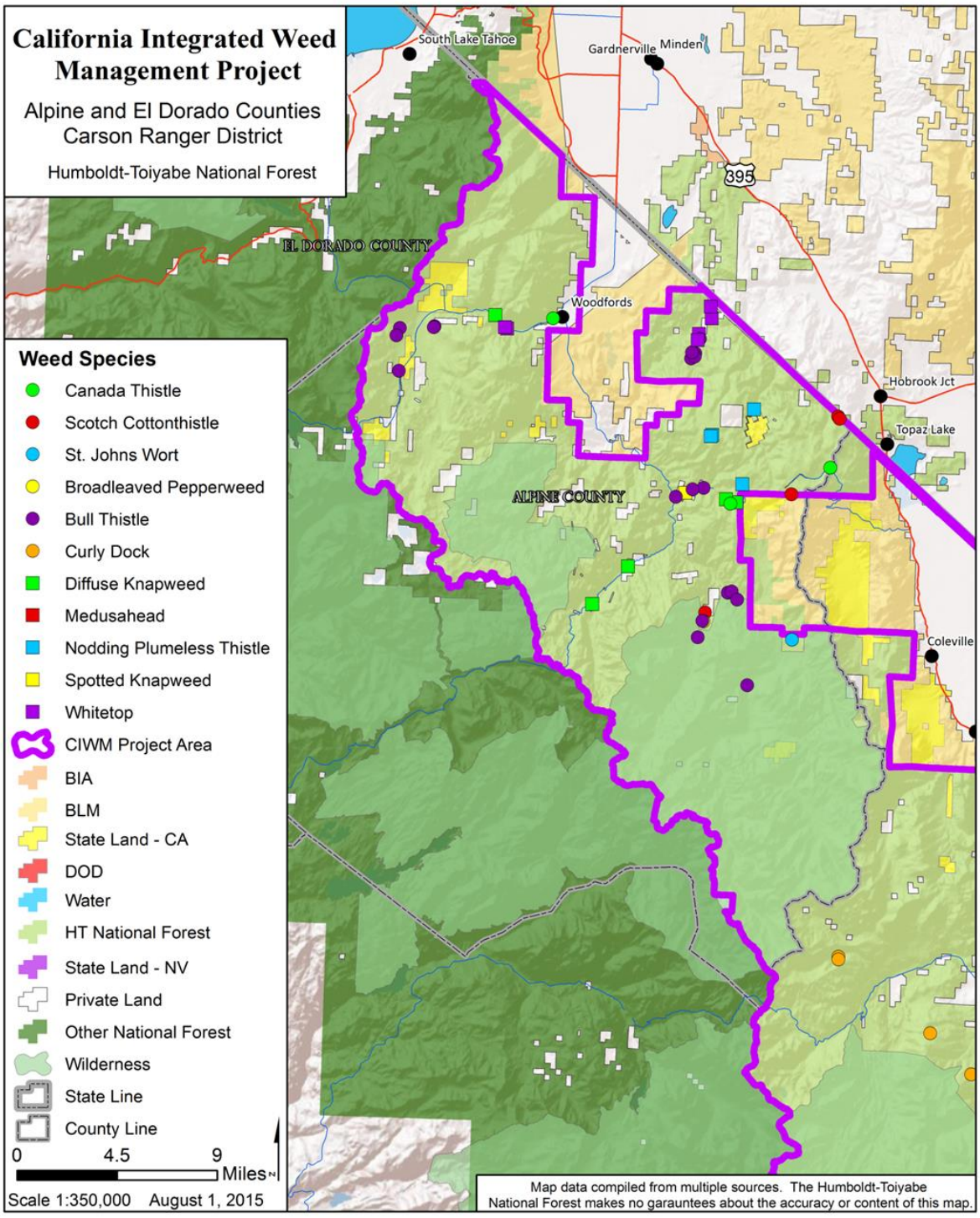
Map 1: California Integrated Weed Management Project vicinity map.



Map 2: Current invasive weed populations within the northern portion of the project area.



Map 3: Current invasive weed populations within the central portion of the project area.



Map 4: Current invasive weed populations within the southern portion of the project area.